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GOVERNMENT CONTROL OF RADIO COMMUNICATION

HEARINGS

BEFORE

THE COMMITTEE ON THE MERCHANT MARINE AND FISHERIES

HOUSE OF REPRESENTATIVES

SIXTY-FIFTH CONGRESS

THIRD SESSION

ON

H. R. 13159

A BILL TO FURTHER REGULATE RADIO COMMUNICATION

PART III

DECEMBER 18 AND 19, 1918



WASHINGTON

GOVERNMENT PRINTING OFFICE

1918

COMMITTEE ON THE MERCHANT MARINE AND FISHERIES.

HOUSE OF REPRESENTATIVES.

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GOVERNMENT CONTROL OF RADIO COMMUNICATION.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,
Wednesday, December 18, 1918.

The committee met at 10 o'clock a. m., Hon. Joshua W. Alexander (chairman) presiding.

Mr. HARDY. Mr. Chairman, before we start the hearing this morning I wish to state that some parties representing inventors have asked me whether it would be possible for them to have a hearing. There are two gentlemen who stated they would like to make a 15-minute presentation each of the attitude of the inventors.

Mr. HUMPHREYS. After the amateurs get through?

Mr. HARDY. Yes; what I would like to do is to suggest the time when they might be heard.

The CHAIRMAN. I suppose we can get through with the amateurs to-day. We want to give everybody a chance to be heard before we close the hearing.

Mr. HARDY. Then we might hear these gentlemen to-morrow morning.

The CHAIRMAN. I agreed with Mr. Penfield, who represents the United Fruit Co., that if he could not be heard this morning we would let him in the first thing to-morrow morning. I think we will get through the hearings to-day and to-morrow; but if we do not, we will continue them over, that is all.

Mr. HARDY. Then I will tell these gentlemen to be here to-morrow morning at 10 o'clock.

The CHAIRMAN. Yes; and I am not sure but what they might be heard this afternoon.

Mr. GREENE. I do not think these amateurs will be through to-day. They want a fair show, and have come from a distance.

The CHAIRMAN. I understand that, and they will get a fair show, but they are not as long winded as some people.

Mr. GREENE. I am not so long winded as some people myself, but I want everybody to have a fair show.

The CHAIRMAN. There is no trouble about that, and everybody will have a fair show. They have always gotten it in this committee under this administration.

Mr. GREENE. Well, they had it under mine, too.

The CHAIRMAN. Mr. Maxim, I believe, is to be heard first this morning on behalf of the amateurs.

STATEMENT OF MR. HIRAM PERCY MAXIM, PRESIDENT OF THE MAXIM SILENCER CO., AND ALSO PRESIDENT OF THE AMERICAN RADIO RELAY LEAGUE, HARTFORD, CONN.

The CHAIRMAN. Please give your name and address and whom you represent.

Mr. MAXIM. My name is Hiram Percy Maxim; my residence is Hartford, Conn.; my occupation is president of the Maxim Silencer Co. I am also president of the American Radio Relay League, at whose request I present this plea for amateur wireless.

The CHAIRMAN. What is the business of the American Radio Relay League? Is it a business concern or simply an association of those interested in this art?

Mr. MAXIM. It is purely an association of amateurs.

This appeal is made by the American Radio Relay League (Inc.), an organization of amateur wireless station owners having a membership exceeding 4,000, who are located in every State of the Union. The present headquarters is the office of its president, Mr. Hiram Percy Maxim, at Hartford, Conn.

It appears that House bill 13159 contemplates, among other things, making it unlawful for the amateurs to communicate with each other by radio.

We propose to show that the latter action will work an unjust hardship upon many American citizens, will constitute a shortsighted policy on the part of the Government, and will unquestionably be imperialistic and thoroughly un-American.

The CHAIRMAN. Are you speaking to the proposed amendment or simply to the bill as introduced?

Mr. MAXIM. I am speaking to both of them. If you will let me lead up to my point you will find that I refer to both of them.

The magnitude of amateur wireless as an institution in our country is probably not entirely appreciated by this committee, and very evidently not at all by whoever proposed this bill. From the beginning of the art up to the outbreak of war in 1917 the American citizen has been free to communicate with a fellow citizen by running a wire from an upper window of his house to a nearby tree and connecting up a few standard and easily obtained pieces of apparatus. He not only has enjoyed radio telegraphic communication with a fellow citizen on the other side of his own town, but he has also enjoyed this form of communication with fellow citizens in more or less distant towns and even in neighboring States. Everyone possessing a certain form of intellectual make-up responds to the marvel of this thing. To him who has a free running imagination this communicating through the air appeals intensely.

In 1912 when it became necessary for the United States to ratify an international agreement controlling wireless the number of private citizens who had become interested and who had educated themselves in this science and who had erected small private wireless stations, either for receiving only or for transmitting and receiving, was so great that they commanded the consideration of the Government and were given a legal standing before the law under the name "amateurs."

The importance and value to the country of these amateur stations and their amateur operators were recognized by the framers of the law of 1912. Certain specified wave length, wave purity, wave decre-

ment, and power were established for amateur use. Careful thought was given these values so that where the limitations were observed there could be no interference caused the Government or commercial stations. Government inspection by inspectors from the Department of Commerce inspected these amateur stations under the terms of the law of 1912, and regularly licensed them and issued official call letters when they were found to comply with the requirements and where they did transmitting as well as receiving. Where they did receiving only, no license was necessary, but in order to control even this it was wisely made unlawful for any amateur to divulge the contents of any message that might be received except to the person to whom the message was addressed. The law provided also for the licensing of the amateur operators of these stations. They were examined as to their ability to transmit and receive and as to their understanding of radio apparatus, and were given license according to their abilities.

We have heard it said that the cost of enforcing the law among amateurs is more than the amateur is worth. The value of the amateur to the country will be referred to in a moment and in a manner which will show how much he is worth. The enforcing of the terms of the law was evidently not considered necessary by the Department of Commerce, because it was not done except in the most flagrant cases and where interference with Government or commercial stations was actually caused. But it came to pass that the amateurs themselves took into consideration attending to this matter in order to reduce unnecessary interference among themselves and to set higher standards of amateur efficiency. It is a matter of record in the American Radio Relay League that steps were actually under way at the outbreak of the war to offer to the Department of Commerce the services of such men as were needed to enforce the law among amateurs and who would be willing to serve as deputy inspectors on a \$1 a year basis and who would organize to report to the regular inspectors of the different districts amateur violations as to power, wave length, wave purity, and decrement. There is no doubt that this offer would be made to the Government later on if it is desired and if amateur radio is permitted. Therefore, any criticism regarding the cost to the Government of enforcing the existing law among the amateurs is not justified.

Under the existing law the amateur increased in numbers by leaps and bounds. When the outbreak of the war came and the President by proclamation required the dismantling of all apparatus, amateur wireless had become an important institution in this country. It supported upward of 25 manufacturing concerns, several magazines, and had in an orderly and systematic manner organized relay lines of little stations, whose work will probably startle this committee when it is recited. For example, one of these relay lines of private citizens started a message at 1.40 a. m. on the morning of February 6, 1917, from New York City addressed to a citizen of Los Angeles, Cal. The message was delivered and the answer was back in New York City at 3 a. m. the same morning. In just 1 hour and 20 minutes these amateurs had communicated across the continent and back.

Mr. HUMPHREYS. If it would not disturb you, I would like to ask you a question right there. How many relay stations were there between those two points?

Mr. MAXIM. This is from memory—the stations started at New York City. It was then relayed by a station, I think, in Cleveland. It was relayed from Cleveland to a station in Illinois; from Illinois I think it went to some station in western Missouri; from the western Missouri station it went to Denver; and from Denver to Los Angeles.

Mr. HUMPHREYS. From Denver to Los Angeles?

Mr. MAXIM. Yes, sir; in one jump.

Mr. BANKHEAD. About what was that distance?

Mr. MAXIM. I think that distance by air line is 700 or 800 or 850 miles; again I am speaking from memory.

Mr. HUMPHREYS. I thought it was something more than 1,000 miles from Los Angeles to Denver.

Mr. MAXIM. No; I may be mistaken, but I do not think it is 1,000 miles. I know in this air line everything is disappointing as to distance.

Mr. HUMPHREYS. How far would you say, Mr. Hadley?

Mr. HADLEY. I do not know how far it is by air line, because there is such a difference between air line and by rail.

Mr. MAXIM. You understand that distance can only be attained on good occasions; the atmospheric conditions have got to be right. This is a comment not so much upon—some people might say unfairly that that is an illustration of where an amateur was using too much power because he was able to communicate from Denver to Los Angeles, but that is not the point. You have missed it. The point is that the amateur is so keen, he is so intent upon getting the closest possible thing to 100 per cent efficiency, that the value of the thing is that his instruments and his powers of listening were so acute that he was able to do this.

Mr. HUMPHREYS. Was that message from Denver to Los Angeles sent by short-wave instruments?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. What length?

Mr. MAXIM. Two hundred meters. Maybe I am thinking of the 2 P M station in New York City, which is exactly 200 meters, as close as we could measure.

Mr. HUMPHREYS. At any rate, it was a short wave?

Mr. MAXIM. Yes, sir; it was within the limit. Just as another example, which I have not cited and which is worth while now that you have spoken of this thing, is that this 2 P M amateur station in New York of 200 meters, of course, with the very finest instruments and with the most finesse which you do not see in most Government or commercial stations—and you see the very finest finesse that can be attained in this art in these amateur stations—that little station, working on 200 meters, was right in touch with Denver direct on more occasions than one.

Mr. HUMPHREYS. From New York City to Denver?

Mr. MAXIM. From New York City to Denver on 200 meters and 1 kw.

Mr. HUMPHREYS. What do you mean by 1 kw.?

Mr. MAXIM. The limit of the power as provided in the old law was 1 kilowatt, which we refer to as 1 kw.

Mr. GREENE. Then you believe that with the advantage you have already that you can even make improvements on what has already been accomplished?

Mr. MAXIM. Yes, sir; you will see us make improvements. You liberate us again, and we will show you improvements in the next six months that will beat last year.

Mr. HUMPHREYS. May I ask still another question? In sending a message from New York, you mean New York City, do you?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. In sending a message that close to the sea to Denver, were those waves short enough so as not to interfere with any ship-to-shore messages?

Mr. MAXIM. Those waves were short enough, they were pure enough, and they were of the proper character, so that the New York Navy Yard could not hear it. Not only did it not interfere with them, but there was no way we could hear it. The instruments at this New York Navy Yard were not fine enough to get down that low. Of course I am speaking now of very beautiful conditions, which the amateur has got the time and the interest and the incentive to work to.

Mr. HUMPHREYS. I understand that, and that shows the possibilities.

Mr. MAXIM. Yes, sir; it does, distinctively. It is one of the things we are very proud of as amateurs.

Mr. GREENE. How long have you been resting now?

Mr. MAXIM. I think it was April 7, 1917, that the President of the United States shut us up. May I proceed, Mr. Chairman?

The CHAIRMAN. Yes.

Mr. MAXIM. Our interest was so keen that improvements in radio apparatus were invented and developed which were made use of by Government and commercial stations. It ought to be of interest to this committee to know that Capt. Edwin H. Armstrong, now of the United States Army, in charge of radio laboratory, Paris, France, was an amateur before the war broke out, and that he is the inventor of the Armstrong regenerative circuit, and that this invention was made as a result of his amateur work, and that it was adopted and was made use of by every single station at the present time. We amateurs hope we may be pardoned for wondering what the Secretary of the Navy would have done without the amateur Armstrong's circuit.

The amateur radio and wireless clubs which had come to be organized in most of the cities and towns throughout the country, and with whom our American Radio Relay League was in contact, invariably had many times as many members operating receiving stations as there were operating transmitting stations. Let us see what the probable number of amateur wireless stations were in the United States when we were forced to close up on the outbreak of the war. Radio stations of the United States, edition of July 1, 1916, issued by the Radio Service of the Bureau of Navigation, Department of Commerce, contains a list of over 5,000 licensed amateur stations. If we take the best estimates of the various clubs and associations throughout the country, we find that the average indicates that there were about 25 unlicensed receiving stations for every licensed trans-

mitting station. Therefore, in July, 1916, there must have been about 125,000 amateur wireless stations in these United States. This figure is more or less checked by those of us who traveled about with this thing in our minds. The number of houses one noticed in town and country in all States where the father or son of the household, or both, had put up their wires and evidently had built their little wireless station was legion. To-day, great numbers of the owners of these stations who were either too young or too old to enter the service are writing to us and asking what we are going to do about this very serious matter of eliminating the amateur.

The location of these various amateur stations should be of value to this committee.

The first district, under the existing law, includes the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut, in which, in July, 1916, there were 848 licensed amateur stations.

The second district includes the eastern section of New York and the northern section of New Jersey in which there were, oddly enough, also 848 amateur stations at the date mentioned.

The third district includes the States of New Jersey (lower section), Pennsylvania (eastern section), Delaware, Maryland, Virginia, and the District of Columbia, in which there were 815 licensed amateur stations.

The fourth district includes the States of North Carolina, South Carolina, Georgia, Florida, and the Territory of Porto Rico, in which there were 105 licensed amateur stations.

The fifth district includes the States of Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, and New Mexico, in which there were 120 licensed amateur stations.

The sixth district includes the States of California, Nevada, Utah, Arizona, and the Territory of Hawaii, in which there were 618 licensed amateur stations.

The seventh district includes the States of Oregon, Washington, Idaho, Montana, Wyoming, and the Territory of Alaska, in which there were 195 licensed amateur stations.

The eighth district includes the States of New York (western section), Pennsylvania (western section), West Virginia, Ohio, and the Lower Peninsula of Michigan, in which there were 823 licensed amateur stations.

The ninth district includes the States of Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, and North Dakota, in which there were 786 licensed amateur stations.

These figures are as of July 1, 1916.

MR. HUMPHREYS. You spoke of Porto Rico, can the amateurs connect with Porto Rico from the land?

MR. MAXIM. I have no record of it ever having been done, sir.

The President's proclamation closed us up early in April, 1917. The number of additional stations set up by amateurs between July 1, 1916, and April 1, 1917, is not available to us at this time, but they may be secured from the records of the Commissioner of Navigation, Department of Commerce. If we judge from the fact that during the month of November, 1916, a total of 285 amateur licenses were issued

for amateur stations, the total number of licensed amateur stations at the time we were closed up must have exceeded 7,000. Mr. Chamberlain told me the other day it was actually 8,562. These were transmitting stations. If we take the best estimates that are procurable as to the number of unlicensed receiving stations to licensed transmitting stations, we are compelled to believe that there must have been in the vicinity of 175,000 amateur wireless stations in this country at the outbreak of war.

An authority of the Radio Club of America, and in charge of the radio apparatus department of a large electric supply house of New York and Chicago, has said in the daily press that these amateur wireless stations represented an investment of not less than \$10,000,000. There are the best reasons for believing that this figure is not extravagant. From our own memory, we can point to Mr. T. E. Gaty, of Morristown, N. J., vice president and secretary of the Fidelity and Casualty Co. of New York City, whose amateur apparatus must represent an investment in excess of \$5,000. Mr. John Hays Hammond, jr., an amateur of Gloucester, Mass., has probably invested in excess of \$15,000 in amateur apparatus. Mr. Leonard D. Fisk, of Hartford, Conn., has invested in excess of \$2,500 in amateur apparatus. Mr. W. H. Carroll, of St. Louis, Mo., has invested in excess of \$5,000 on amateur apparatus. The speaker has invested over \$2,000 in his amateur apparatus. What is to become of all this property if we wipe out amateur radio? Will it be considered right to pass a bill here which will render this property and all other property of the amateur stations of the country useless?

This committee would do well to understand that the amateur is not always a boy in short trousers. We consider our knowledge of the amateurs of the country as second to none, and this knowledge is that the majority of them are men between the ages of 20 and 30. There are a large number of boys, and there are also a large number beyond 30. The average type of young man who is interested in wireless represents the mentally keener among us. He is fired more than ordinarily with that wonderful American spirit which has been shown the world on the battlefields of Europe during the past year. Wireless appeals profoundly, probably because it represents the profoundly difficult. Wireless arouses the cooperation and the admiration of the young man's parents. They believe it leads to better thought and better things. It is our experience that the majority of the younger men interested in wireless come from families of the most modest means. We wish we might tell you of the examples that have come to our personal notice of the untiring effort and the intensity of purpose in which the sole animating motive has been to earn money to buy a pair of first-class head phones, or a regenerative receiving turner, or an amplifying vacuum valve detector—apparatus which the amateur can not make himself. These examples compel the respect of us more fortunate ones who are in a position to spend \$25 without serious consequences.

We believe it will be of assistance to this committee to have a list of some supply houses who furnish apparatus and supplies for amateurs. As typical, we are taking a list from a single issue of the amateur wireless magazine "QST" of the issue of March, 1917. There are of

course many others, but this is typical and has the advantage of understating the case.

Clapp Eastham Co., Cambridge, Mass.	Mignon Wireless Corporation, Elmira, N. Y.
Adams Morgan Co., Upper Montclair, N. Y.	Lenzite Crystal Corporation, Pasadena, Cal.
W. J. Murdock Co., Chelsea, Mass.	Wireless Experimental Apparatus Co., Philadelphia, Pa.
Thordarson Electric Manufacturing Co., Chicago, Ill.	Wireless Manufacturing Co., Canton, Ohio.
C. Brandes (Inc.), New York City.	H. A. Reverend Manufacturing Co., Kansas City, Mo.
Radio Apparatus Co., Pottstown, Pa.	Electroset Co., Cleveland, Ohio.
Holtzer Cabot Co., Toledo, Ohio.	McGuire & Shotten, Albany, N. Y.
William B. Duck Co., Toledo, Ohio.	Elliott Electric Co., Shreveport, La.
E. T. Turney Co., New York City.	Jones Radio Co., Brooklyn, N. Y.
F. B. Chambers, Philadelphia, Pa.	Borger-Decker Co., Buffalo, N. Y.
Doubleday Hill Electrical Co., Pittsburgh, Pa.	J. H. Ferris, Royal Oak, Mich.
Klitzner Wireless Apparatus Co., Racine, Wis.	J. F. Arnold, New York City.
Winger Electric Manufacturing Co., Chicago, Ill.	Fosco Corporation, Chicago, Ill.
A. H. Grebe & Co., Richmond Hill, N. Y.	De Forest Radio Telegraph & Telephone Co., New York City.

If we permit the unamended bill under discussion to become law, we will at a stroke block the business which these concerns have had a right to expect would come back to them after the war and after the amateur had been allowed to open up. What is infinitely worse, we block the ambition of over 100,000 of the best brains we possess to apply their efforts in that field in which they most want to work. We will have very successfully prevented them from repeating in the future what we shall presently show they have done in the past to the glory of themselves and their country.

We submit that is too important a matter to pass over lightly. No man should dare to say what embryo world-famous scientist has not his fate pending in this committee room at this moment. We consider it our sacred duty as an American citizen who perhaps has been by chance placed in possession of special knowledge of the subject, to present to you these facts and direct every ounce of energy we command to urge upon you to so modify this bill that by no possibility can it eliminate the amateur wireless station or its owner.

This phase of this matter is not complete without considering the untold possibilities in the way of collateral or side developments that any scientific person knows unavoidably accompanies work of the character we are discussing. An example we can point to at this moment is certain work going on by an amateur which is aimed at the separation of oxygen and nitrogen from the atmosphere by a means that was suggested during the operation of his amateur wireless station. We also know of certain promising experiments in the joining of metals which were suggested to an amateur as a result of working his amateur station. To anyone who is familiar with inventions and scientific development, it can not be otherwise than apparent that there must be thousands of inventions in the making and which may be of priceless value, and which you will kill if you prohibit American citizens from operating amateur wireless stations.

It would take too much time to present a list of the amateurs who volunteered in the Navy and in the Army when the country went to war in April, 1917. Our military forces were faced with the absolute want of a great corps of radio officers, instructors, and opera-

tors. They were needed immediately. There was no time to train them. The emergency was so great that I, as the executive head of a large amateur organization, was called on long-distance telephone by a naval officer at one of the largest navy yards and asked if I would call upon him at my earliest convenience. I called the next day with Mr. A. A. Hebert, the vice president of our American Radio Relay League. This officer asked for our cooperation in securing 500 amateurs' enrollments in the Navy immediately, and as much first-class amateur apparatus as could be located. He explained that the experienced amateur would require very little training. He also stated that the necessary radio apparatus was not available immediately, and that the apparatus of the good amateur stations, if obtainable, could be made use of at once. We extended our very best cooperation and the Navy got its experienced amateurs in the next few days.

I have a letter from a young amateur named J. K. Hewitt, who was one of the young men of our organization who volunteered. He writes that he and two friends who were not amateurs enlisted together. To use his own words, "I was the only one of the three that had amateur experience. I finished the training at the electrical class, Brooklyn Navy Yard, in three weeks and went to sea. My two pals took seven months, and they did not begin to know what I did." This young man was torpedoed by a German submarine and his ship sunk from under him, and was rescued after being in the water for some hours. He now solicits my help in urging you not to pass a law that will prohibit his returning to amateur operating when he is mustered out of the service.

There is another letter which contains information which this committee would do well to have. It is from Lieut. C. D. Tuska, United States Army commander of Radio Training School, Camp McClellan, Anniston, Ala. Lieut. Tuska is a very good example of the typical American amateur. Up to the outbreak of the war, he had a good amateur station, most of which he had built himself, and had become one of the founders and the secretary of the American Radio Relay League, had founded and was the publisher of the amateur wireless magazine, "QST" and when the war came, he volunteered. His radio knowledge, gained exclusively from his amateur experience, caused the authorities to place him in charge of the organization of radio training, without as much as one hour's training from them. He went straight from amateur wireless to Government wireless training with an officer's commission, and he represents a clean-cut and eloquent example of the value to our Government of the amateur. His letter reads:

CAMP MCCLELLAN, ALA., November 15 1918.

Mr. H. P. MAXIM,
Hartford, Conn.

DEAR MR. MAXIM: This is just a short personal note to you to let you know that my job seems to have finished with the signing of the armistice. That is the way things appear at this time and if I am lucky I shall be back at the old amateur radio work before very long. It will be quite a change to start operating an amateur station after the kind of radio work I have been doing here.

You would be perfectly amazed if you were able to see with your own eyes the way the amateurs have come across in the case of the Army. I never have been able to tell you very much about the radio training I have been doing.

but I have turned a whole lot of operators out for the Air Service and have become pretty well acquainted with the type of human it takes to make a first-class radio operator. I don't believe you will be very surprised when I tell you the very first sort of a student we looked for is an examateur. He seems to have had all the experience and all we have to do is to acquaint him with a few special facts and he is ready for his Army job. If we can't get an amateur or a commercial radio operator, then we try to convert a Morse operator, but it is a pretty hard job. After the Morse man, we take electrical engineers, and from then on, but a man without previous experience is almost hopeless as far as my experience has shown. Of course we can make an operator of him in 15 or 16 weeks; whereas, the other way an amateur, if fitted, in as few as 100 hours. They've surely done their bit and I am mighty proud I was one.

With very best regards, I am, sincerely,

C. D. TUSKA.

It is very much to the point at this juncture, in order to show what we amateurs did for the Navy and Army, to read the editorial entitled "War," in the May, 1917, issue of our American Radio Relay League Magazine, "QST":

Well, fellow amateurs, war has come to our good old Star Spangled Banner and all the sacrifices we have dimly dreamed in the past are now up to us to make. Yesterday's fancies are to-day's realities, and mighty grim ones at that. Our stations are all closed. At this writing there is no knowledge when we shall be allowed to reopen. Your guess is as good as ours. But there is one thing we do know positively. That is that even if we may not operate our own stations, we may operate our Uncle Sam's. And this constitutes the most golden of all golden opportunities.

We are asked by our country to come and help in the hour of need with our special radio knowledge and training. Radio operators are wanted by both the Navy and Army and the service is made more agreeable than any military service ever before known. We are asked to serve only for the war if we prefer, and we are given living conditions, pay, and training of the most favorable kind. No one of our membership in good health and free from dependents should hesitate a moment to enroll. To those who do not, it will be the one big regret of their lives in the years to come.

There will be a German War Veterans' Association, and honor rolls, and you and yours will be very proud to have your name among the others. You can put it there now. You can not later, and when we are all opened up again with new and better equipment, and our A. R. R. L. has acquired the strength of having passed through the fire, then will those who have done their bit be proud of it, and those who have not will be very, very sorry.

There was another matter which occurred some time before the war and in which the amateur showed his value to the Government. This was the case of Mr. Charles F. Apgar, of Westfield, N. J., the owner of an amateur receiving station. He had noticed, as had all of us, that the Sayville commercial station was sending out messages to German cruisers. After this was stopped and Navy censors placed in the station, Mr. Apgar and the rest of us noticed most peculiarly worded messages. Mr. Apgar conceived the idea that it might be interesting—this is typical of the amateur—to make a permanent record of these messages, so as to absolutely avoid the possibility of any personal error. He arranged a dictagraph onto his receiving instruments and took records night after night of what Sayville sent out. These records, when studied, indicated most suspicious possibilities and he reported the circumstances to the radio inspector at New York City. It was immediately referred to the secret service. The latter department went to Mr. Apgar's station and, under Mr. Apgar's direction, a new series of records were taken. These records and Mr. Apgar's testimony were later used in court with the result

that the Sayville station was taken from its German owners. Certainly it was worth having amateurs around just for this one case.

Mr. EDMONDS. There were naval stations in that neighborhood that could have taken that too, were there not?

Mr. MAXIM. Yes, sir; but the point that this committee would do well to consider there is that this took a lot of trouble and it took a lot of time and it took a lot of fussing around to do this little trick; but that is what the amateur likes to do. He is not a paid man. He is working for—

Mr. SCOTT (interposing). Sport?

Mr. MAXIM. Well, I do not know what to call it. It is not sport. It is that thing which we Americans have—he is working to do something and to get there.

Mr. GREENE. Glory?

Mr. MAXIM. Yes; maybe it is glory. I do not know what to call it.

We amateurs are hopelessly scattered at the present time in the Army and the Navy. It would involve a great labor to prepare a list to show where we are and what we are doing. We do not believe it necessary to do this, and we appeal to this committee to be fair enough to give this point the full weight it deserves when we state that purely from the memory of those of us who could be hastily called together, we are able to present the following list of wireless friends who have given to the service of their amateur obtained radio knowledge. It should be borne in mind that most of these and thousands of others are mute in this matter because of military regulations, and they may not speak in their own behalf before you at this time unless you call them:

Lieut. Commander A. H. Taylor, naval air base, Hampton Roads, Va. Mr. Taylor was an amateur at the University of North Dakota.

Lieut. J. C. Cooper, jr., United States Navy, naval communications office, Washington, D. C. Mr. Cooper was an amateur in charge of one of our relay lines with headquarters at Jacksonville, Fla.

Lieut. C. D. Tuska, United States Army, commander radio school, Camp McClellan, Ala. Mr. Tuska was secretary of our A. R. R. L. and publisher of "QST."

Ensign M. B. West, United States Navy, officer in charge, radio school, Great Lakes, Ill. Mr. West was an amateur of Lima, Ohio.

Capt. E. H. Armstrong, United States Army, in charge of radio laboratory, Paris, France. Mr. Armstrong was an amateur, president of the Radio Club of America, and is the inventor of the well-known Armstrong regenerative circuit in general use at this time.

J. O. Smith, radio expert, Division of Military Aeronautics, Washington, D. C. Mr. Smith was an amateur of Valley Stream, N. Y., and a district manager of one of our relay trunk lines.

Howard L. Stanley, plant approvals officer, Bureau of Aircraft Production, Western Electric Co., New York City. Mr. Stanley was an amateur at Babylon, N. Y., and a director in our A. R. R. L.

Lieut. Victor F. Camp, United States Army, Aircraft Production. Mr. Camp was an amateur of Brightwaters, N. Y., and a director in the A. R. R. L.

Ensign C. R. Runyon, United States Army, executive officer Radio Compass School, Pelham Bay, N. Y. Mr. Runyon was an amateur at Yonkers, N. Y., and held the record for number of amateur messages handled in a month. He is a director in our A. R. R. L.

Lester Spangenberg, radio inspector, Bureau of Steam Engineering, United States Navy. Mr. Spangenberg was an amateur in charge of one of our relay lines.

Joseph Fried, radio drafting work, Bureau of Steam Engineering, United States Navy.

George T. Allen, radio inspector, Bureau of Steam Engineering, radio compass work.

Lieut. Walter Lennon, in charge radio telephone work, Bureau of Steam Engineering, United States Navy.

I can go on here and cite amateurs who are in London on Admiral Sims's staff, in Siberia, in France, in the tank service, but I will not take the committee's time to read them all, but will submit them for the record.

Ensign C. A. Service, United States Navy, Communication Service.

Ensign Thomas J. Styles, United States Navy, Radio Aircraft Section, Bureau of Steam Engineering.

Ensign Charles Horn, United States Navy, radio investigation, third naval district.

Ensign G. E. Burkhardt, officer in charge radio school, Pelham Bay, N. Y.

Ensign M. Z. Bishop, radio aircraft section, Newport Navy Yard. Mr. Bishop, notwithstanding the fact he was an amateur, has been officially commended by Capt. Todd for the excellence of the Newport aircraft station as to general appearance and operation.

Ensign George J. Else, attached to Admiral Sims's staff, London, England.

Ensign Frank King, radio officer, United States Naval Air Station, Dunkirk, France.

F. W. Keeler, United States Army, American Expeditionary Forces, somewhere in Siberia.

H. B. Deal, United States Navy, Marconi School, Cleveland, Ohio.

W. P. Corwin, United States Navy, Naval Radio Station, London, England.

H. J. Burhop, United States Navy, Naval Radio Station, Detroit, Michigan.

L. A. Kern, United States Army, Tank Corps, somewhere in France.

R. H. G. Matthews, United States Navy, district commander's office, Chicago, Ill.

L. E. Dutton, United States Navy, Naval Radio Station, Bar Harbor, Me.

G. B. Bauer, United States Navy, Naval Radio Station, Ludington, Mich.

A. Ball, United States Navy, Naval Radio Training Station, Bar Harbor, Me.

P. B. Parks, United States Navy, Naval Radio Station, London, England.

R. J. Iversen, United States Navy, Naval Radio Station, Bar Harbor, Me.

J. Clausing, United States Navy, Naval Radio Laboratory, Washington, D. C.

L. A. Gebhard, United States Navy, Naval Radio Station, Belmar, N. J.

Cecil Bridges, United States Navy, Naval Radio Station, Duluth, Minn.

W. Hauenstein, United States Navy, district commander's office, Great Lakes, Ill.

F. Finehout, United States Navy, Reserve Force, Purdue University, Lafayette, Ind.

J. M. Clayton, United States Army, Buzzer School, University of Arkansas.

W. Woods, United States Navy, Naval Radio Station, Bar Harbor, Me.

L. W. Paust, United States Navy, Naval Radio Station, Belmar, N. J.

L. C. Young, United States Navy, Naval Air Base, Hampton Roads, Va.

A. F. Rufsvold, United States Navy, Naval Air Base, Chatham, Mass.

J. C. Strobel, United States Navy, United States radio inspector, New York City.

B. Butcher, United States Navy, Naval Radio School, Great Lakes, Ill.

R. T. St. James, United States Navy, Naval Radio School, Great Lakes, Ill.

W. P. Rathert, United States Navy, Naval Radio School, Dunwoodie Institute, Michigan.

S. Kauffman, United States Navy, U. S. S. *Texas*.

R. F. Laidlaw, United States Navy, Naval Radio Station, Milwaukee, Wis.

H. H. Shotwell, United States Navy, Naval Radio Station, Harvard University, Cambridge, Mass.

H. T. Johnson, jr., expert radio aid, in charge Aircraft Radio, United States Navy. Mr. Johnson was an amateur and a member of the board of directors of the Radio Club of America.

Lieut. H. Sadenwater, United States Navy, radio officer, Aircraft Radio. Mr. Sadenwater was an amateur and before the war had been appointed a radio inspector of the Department of Commerce, stationed at New York City.

I would like to point out to you gentlemen a very interesting thought. Let your imagination just feed on this a moment. These young men, like Lieut. Cooper, are coming back into the amateur service. Think of it. You are going to have, if you let us live, if you give us the breath of life, when these young men open up again, the finest radio traffic handlers, experts, and inventors in the world. You are going to let loose the finest brains this country has ever seen. You can not stop it, gentlemen; it will not do.

Even the one who introduced this bill, with all his lack of appreciation of the patriotism displayed by us amateurs who volunteered immediately when they asked us, will have difficulty with this short list made up from memory only. To all else it ought to be apparent that the knowledge of us amateurs was of tremendous assistance not only in those first desperate days of unpreparedness but since then, and even right now at this moment.

In the unamended bill the only radio stations shall be naval stations, experimental stations, training-school stations. No mention is made of the amateur, as is the case in the existing law of 1912, and also as was the case in House bill No. 2573 introduced by Mr. Padgett on April 9, 1917. The amateur is entirely ignored. We wish most

positively to protest against this, because we maintain it amounts to the total elimination of the amateur. It is not satisfactory to us to gloss over this question by explaining that the amateur is tacitly included under "experimental stations" or "training-school stations." Such an explanation is to our minds indirect, doubtful, and not what we regard as straightforward and square treatment. Such an arrangement would leave us at the mercy of unfriendly interpretation of the law, and it seems to us there is no need of ambiguity. We submit that our record is such that we not only deserve to be squarely and directly dealt with and recognized before the law of our country but also that it would be a public misfortune if we are not. We are not asking for anything new. All we ask is the same recognition in the future that we have had in the past under a law which after five years of experience commands respect from all of us.

We are not finished with this aspect of this subject until we point out one more important detail. If we change the existing law and blot out the amateur, what will be our situation some years hence if another great national emergency should arise? We have demonstrated beyond all question of argument the value of the wireless amateur when the great national emergency arose in April, 1917. If there are to be no amateurs at that coming day, when we will again face a national emergency, and no man should say such a day will never come, it is very likely that we will be found tremendously less prepared radiowise than we were even in 1917. It is quibbling to avoid this point, at least, according to the straightforward mental processes of those young men who will soon be back among us. They are going to want to continue to operate their little wireless stations, especially when they know that observing the law of 1912 will positively prevent them causing any trouble. In their behalf and while they are absent from the country or unable to speak to you on account of military regulations, we emphasize as solemnly as we know how that it is shortsighted to brush aside with the wave of a hand, as this unamended bill proposes, the amateur.

Most of the amateurs do not know that you are considering their elimination here at home while they are away. What they will think when they come home and find that you have wiped them out without explanation and with no understandable reason, should be left to the imagination. It will certainly bring the question of Government ownership very much to the front in the mind of those stout-hearted young men, who many people think will have influence in political affairs in the days to come. The mental attitude that will be taken involuntarily by these younger men who are now abroad, and who will want to be amateurs again when they come home, is something which we are firmly persuaded this committee would do well to consider. We know this young man, because we have been about with him, we have headed his organization for some years, and because he talks to us daily and writes to us. We believe we speak truly when we say that his business is going to partake of the smell of "Verboten" to him, with all that this term implies.

It is a waste of breath to tell him that he interferes with Government and commercial stations. He knows better, except, of course, in those rare cases of infraction of the law, or unless he is very close by. He knows that not only does his power and his wave length, wave purity, and decrement prevent harmful interference

to the users of longer wave lengths, but he also knows the reason why. He also knows that when examples of amateur interference are pointed to as a reason for prohibiting amateur wireless altogether, that every one of them represents a violation of the law, and therefore easily preventable. He also knows that considering the great number of amateur stations operating, that the total number of cases of interference makes a ridiculously small percentage. He also knows that no great effort was made to enforce the law among amateurs, and that even the small number of cases of interference would be materially reduced if measures were taken to enforce the present law.

While on this point, we believe it desirable to dwell a moment upon what the amateur has done among himself. The extent to which he has made use of his brains is something which would command the admiration of this committee were they as conversant with this subject as are we. This radiotelegraphic communication between citizens has been developed by a class of young men that we consider intellectually the highest type we have among us. It takes brains to understand radiotelegraphy. It takes more brains to design and build efficient radiotelegraphic apparatus. A great many amateurs have and always will build their own apparatus from the raw material. This takes brains. It takes still more brains to be able with this home-made apparatus and with the small amount of power that is permitted the amateur by law to carry on reliable communication so that citizens separated by hundreds of miles may talk with each other through the air. These amateurs have done all this, and when we were actually stopped in April, 1917, we had just got into working order regular lines of little stations which bade fair to become one of the astonishing development of the times.

Is it to be wondered at that the young fellows who have been doing this sort of thing should turn out to be the soldier we have seen on the battle fields of France under the Stars and Stripes? They typify America in every way. They are perfectly willing to pull in their wires and take apart their improvised but highly ingenious apparatus, if it will help the country win the war. No sacrifice, even of life, is too great for them to make. But when the war comes to be over, and the President of the United States has said so, and the war has been won, and it is established who had a good part in winning it, they are no longer willing to leave down their wireless apparatus. They can not see the necessity for it, and it is silly attempting to make them. When you try, you are un-American, in their judgment, to express it mildly.

In order to adequately protect and assure the future of the amateur, we urge the adoption of the amendments which refer to the amateur and have been presented by the Navy Department. These amendments were decided upon at a conference between our president, vice president, secretary, and representatives of the Navy Department, and in our opinion assure the future existence of the amateur under conditions favorable to a continuation of his successful development.

Mr. HARDY. Is that this amendment here?

Mr. MAXIM. I do not know the one you have there.

Mr. BANKHEAD. The one offered here by Lieut. Cooper.

Mr. MAXIM. Yes, sir.

Mr. BANKHEAD. Is that entirely satisfactory to the amateur interests?

Mr. MAXIM. Broadly speaking, that is satisfactory to us.

Mr. BANKHEAD. Have you looked at the amendment?

Mr. MAXIM. That was arrived at in conference but I did not see a copy of it until last night, but I will say this formally to you, that in our opinion it assures the future existence of the amateur under conditions favorable to a continuation of his successful development.

It is true certain additional restrictions are proposed, such as the licensing of amateur receiving stations as well as the transmitting stations, limiting amateur power at certain distances from Government receiving stations, and requiring operators' license approximately the equivalent of the present second-grade commercial license in order to be permitted to transmit signals which may be heard beyond a State border. We approve of these restrictions because we recognize they are reasonable and that unless our amateur status is based upon reasonableness, we can not expect to continue to enjoy the public sympathy and approval we now have.

We have no comment to make upon the question of Navy control and ownership of radio communication.

In this connection, I have two affidavits, Mr. Chairman, which I would like to make a part of my brief. One of them is by J. Owen Smith, who, being duly sworn, deposes and says that he did certain things as a result of his amateur training, and that a captain in the Army says that it would have been very good for England if England had had amateurs and had encouraged them. The other affidavit is a statement of some very superior receiving that was done by an amateur apparatus. (For affidavits referred to, see pp. 399-400.)

Mr. HUMPHREYS. Let me ask you a question right there. Does England, under her regulations, discourage amateurs?

Mr. MAXIM. I do not think England discourages it. I think England has them in a very, very limited way. I confess I am not familiar with the law of England.

Mr. HUMPHREYS. Then it is not due to any law, so far as you know.

Mr. MAXIM. I do not think I had better venture any comments on that because I am not familiar with the subject in England.

Mr. BANKHEAD. Mr. Maxim, could you give any intelligent or approximate estimate of the amount of capital invested by manufacturers of amateur apparatus, whose names you gave a while ago.

Mr. MAXIM. I think my estimate would compare in accuracy with that of almost any amateur. I would think the capital invested at the close of the war would probably be from two to three million dollars by the manufacturers. That is purely an estimate as I run over in my mind the number of manufacturers I can think of at the present moment.

Mr. KINCHELOE. What is the average wave length used by the Government from ships to coast?

Mr. MAXIM. Six hundred meters.

Mr. WHITE. May I ask you a question about this amendment? It refers to the Continental-Morse code, and provides that the license shall require that the operator must show his ability to send and receive at least 75 letters per minute in the Continental-Morse code. Is there any other code?

Mr. MAXIM. Yes, sir.

Mr. WHITE. Then why should this be limited to the Morse code? Why should it not provide that the licensee shall show his ability to send 75 letters per minute according to that code or an equivalent capacity? Why should you tie it down to that particular code when there are other codes?

Mr. MAXIM. I might say, sir, that if you knew the situation you would say it was tying it down pretty tight to tie it to one code, but to make it otherwise—

Mr. WHITE (interposing). I do not know the situation and that is why I ask the question. Why is it tied down to that code if there are other codes?

Mr. MAXIM. There is only one other code in normal use, and that is what we call the American landline code.

Mr. WHITE. However efficient a man may be in the use of that other code, he would not be entitled to a license under this amendment unless he could meet this requirement as to the Continental-Morse code?

Mr. MAXIM. No radio signals are transmitted on the American-Morse code that I know of. They are all transmitted on the International-Morse code, and that is tying it up pretty tight, to receive 15 words, or 75 letters, a minute on that code. For goodness sake, do not ask them to be that efficient on other codes as well, especially since the other codes are never used.

Mr. HUMPHREYS. That was not the question, as I understand it. The question was why tie him to any code? Why not state if he can send 75 letters by the Morse or its equivalent in any other code? That may be a thoroughly impracticable suggestion from your viewpoint, because you are informed on the subject and I am not, but I was just wondering why that would not be more liberal.

Mr. MAXIM. That would mean this, sir: That a man who was an expert in landline telegraphy could come in and pass his examination and he would not be able to read your QRT, nor your stop sending signal, nor your SOS signal on the Continental-Morse code.

Mr. BANKHEAD. As I understand the Morse code, it transmits the alphabet by dots and dashes.

Mr. MAXIM. To indicate a dot in the landline code there are two clicks coming close together, click-click; a dash is two clicks separated like this: Click—click.

Mr. WHITE. That is the same system used in telegraphy?

Mr. MAXIM. Landline telegraphy.

Mr. WHITE. Then the purpose of this language is to coordinate and standardize it; is that the idea?

Mr. MAXIM. The purpose of this is—

Mr. WHITE (interposing). This refers to the Morse code?

Mr. MAXIM. That is in the old law, and the idea of the framers of the law was this: It is not safe to have anybody operating a transmitting station unless he can read the code which is in use and be able to understand if somebody wants him to stop sending.

The CHAIRMAN. The international regulations require the Morse code?

Mr. MAXIM. Yes, sir.

The CHAIRMAN. Otherwise, we would have endless confusion in the transmission and receipt of messages?

Mr. MAXIM. Yes, sir.

The CHAIRMAN. In other words, it would be very much like the confusion of tongues at the building of the Tower of Babel, I imagine.

Mr. BURROUGHS. The amateurs, then, would not object to this requirement of 75 letters, according to the Continental Morse code, as provided in this amendment?

Mr. MAXIM. That is 15 words a minute, and 15 words a minute is the existing second-grade commercial test in order to secure a license.

Mr. BURROUGHS. And they would not object to that?

Mr. MAXIM. The A. R. R. L. is an organization, as I say, of about 4,000 members. There are other amateurs besides us, but we do not object to it.

Mr. HUMPHREYS. And it is your opinion, at least, that they should not object to it?

Mr. MAXIM. In my opinion, they should not object to it, because what we are trying to do is to look forward into the future. We are trying to so broaden this thing so that you will be proud of us amateurs in the years to come, and we do not want to be put in the position of asking for anything that is unreasonable.

Mr. EDMONDS. The requirement for an amateur here is higher than the requirement for a second-grade commercial operator, is it not?

Mr. MAXIM. My understanding is that it is not.

Mr. EDMONDS. I understand a second-grade commercial operator is required to send 12 words or 60 letters per minute.

Mr. MAXIM. Then it is too high. It should be no higher than the existing second-grade commercial license.

Mr. EDMONDS. Where do you propose that these young men should learn to send 75 letters a minute?

Mr. MAXIM. Oh, you leave it to the young man, and he will learn how to receive it or send it.

Mr. EDMONDS. And you think that can be done without interference or without any trouble?

Mr. MAXIM. I took this thing up when I was beyond the age of 40, when one's intellect is not quite as nimble as when you are younger, and it took me a good part of a year to take 20 words, which is the first-grade commercial requirement.

Mr. EDMONDS. I mean, how is he going to learn to send at all if he is restricted in the use of any apparatus until he can send so many letters?

Mr. MAXIM. He could be taught with a push button and your front doorbell.

Mr. EDMONDS. And just work inside.

Mr. MAXIM. Yes, sir; that would not infringe the law, and he would be in position to learn the code in that way.

Mr. BANKHEAD. What is the minimum cost of installing an amateur apparatus if, for instance, a country boy in my district wants to experiment with wireless?

Mr. MAXIM. A country boy or a boy of small means, whether he is in the country or in the city, will put up a wireless station with baled-hay wire. I have seen them myself; they use the wire that comes off of bales of hay, and then he will use a tree at the back of his house, and he always selects a hencoop for one end. I can not say why, but he always selects a hencoop. The other end will lead into his house and probably have no support at all. Now, so far there is no expense. Then he will go down town, or he will send to one of these

supply houses if he lives in the country, and will buy a certain number of pounds or half pounds or three-quarters of a pound—and he has got it figured down to the inch—of exactly the kind of copper wire he wants to wind the receiving tuner, which consists of a coil of wire wound on some cardboard, and inside of that another cardboard tube with wire wound on it. He will take that and will go and beg from somebody a little piece of galena. It is astonishing where he gets it, but he has a friend somewhere who knows a friend who has a piece of galena in his collection. He will get a piece of galena, and then he will take a little piece of the finest wire he can get, and he will get a little thread out of this flexible cord, which he will have attached to the electric light in the house; in other words, a little piece of fine copper wire—I have seen my own boy do this—and then he will just get a nice little contact on that piece of galena, and if he can get a pair of head telephones—he can not make them, and he has got to get those somewhere, and I have known them to borrow them for a week at a time, and I have loaned mine to all kinds of boys to help them along, but if he can borrow his head phones, after buying his wire, he will have a receiving station, and I suppose the total expense might be about \$3.50.

Mr. BANKHEAD. Suppose he has to buy those things.

Mr. MAXIM. Mr. Chambers, what is the price of a pair of head phones?

Mr. CHAMBERS. The price varies. You can buy a pretty good set for \$3.50. They generally save up for them 10 cents at a time, and when they come in to pay for them they will have a handful of dimes, which they usually dump out of a little bag.

Mr. BANKHEAD. Do you think, then, he could establish such an apparatus within the range of \$10?

Mr. MAXIM. Oh, yes.

Mr. BANKHEAD. If he is enough of a genius as a beggar and borrower.

Mr. MAXIM. A great many boys that had \$10 would expect to get a station the equal of Arlington.

Mr. KINCHELOE. If a message of a wave length of 250 meters were to interfere with another message of 600 meters, is that a fatal interference?

Mr. MAXIM. Will you mind stating that once more?

Mr. KINCHELOE. I do not know whether I am stating what I really want to know, because I do not know a thing about this proposition. If a wireless message of 250 meters wave length were to interfere with a message of 600 meters, would it be a fatal interference with the 600-meter message?

Mr. MAXIM. Of course, you presuppose it could interfere.

Mr. KINCHELOE. Yes; I say if it did interfere—on that hypothesis would it be a fatal interference to that message of 600 meters?

Mr. MAXIM. In the first place, it could not interfere.

Mr. KINCHELOE. You say it could not interfere?

Mr. MAXIM. It could not.

Mr. KINCHELOE. What messages, then, can be in interference with another?

Mr. MAXIM. The homeliest example I can state that will convey it to your mind is that if you walk up to a piano with the cover up and strike a note you will hear certain strings respond. Only those

strings will respond which are in tune with the note that you struck. If you send on 200 meters, only those strings will receive which are on 200 meters. If you are sending on 200 meters, you will not find that the soprano notes or the baser notes in your voice come back at all. There is no resonance. There is no comeback.

Mr. KINCHELOE. Now, let me learn a little further. It seems to me the contention of the Secretary of the Navy, and I heard his statement before the committee, was that the main thing he was afraid of in reinstating amateurs would be interference. Now, upon what hypothesis can there be an interference from ship to coast?

Mr. MAXIM. An infraction of the amateur law; that is, an amateur sending on a wave length in excess of what he has any right to send on.

Mr. KINCHELOE. You mean under the existing law?

Mr. MAXIM. Yes; under existing law. The existing law says that the amateur shall be permitted to send on 200 meters. I have known them to send on everything—such a broad tune that you could tune him at 2,000 and you could tune him at 200.

Mr. KINCHELOE. You mean by that, he violated the law?

Mr. MAXIM. Yes, sir. If you do not violate the law, there is no reason why you should interfere unless you are right up under the eaves of a Government station, which is receiving.

Mr. GREENE. This proposition, as it comes before us, is to broaden the opportunity of the Navy to go into the commercial business, and I want to know whether you amateurs have given any consideration to the fact of the Navy entering that field.

Mr. MAXIM. No, sir. We have no comment to make upon that, at all.

Mr. GREENE. You do not wish to make any comment on that?

Mr. EDMONDS. You do not think it will prevent boys from studying wireless because there is no place for them to go, if they want to make a business of it in the future?

Mr. MAXIM. I can see where that might be used as an argument; yes, sir.

The CHAIRMAN. You say this amendment suggested by the Navy Department is satisfactory to you?

Mr. MAXIM. It seems to us to be satisfactory; yes, sir.

Mr. SAUNDERS. I understand that was worked out by representatives of the amateurs and the Navy Department.

Mr. MAXIM. Yes, sir.

Mr. GREENE. You have not given any consideration to the development of business; that is to say, at present that is under the Department of Commerce, and I notice in the Washington Herald this morning that Secretary Redfield wants an opportunity to put on 30 more specialists for the purpose of broadening our trade, and that he has the approval of President Wilson to his scheme. He wants to broaden out the business opportunities. The Department of Commerce has done a good deal of exploiting looking toward foreign trade. I do not know that they have struck any yet, but they have been exploiting a good deal in the press about the development of foreign trade and doing a good deal of blowing, but I do not know that they have accomplished any results; but if they do want to do that, you have not given any thought to that part of it. You are simply concerned about the amateurs?

Mr. MAXIM. All I wish to ask is that you protect the future existence of the amateur.

The CHAIRMAN. You are not in the business for commercial purposes?

Mr. MAXIM. No, sir.

Mr. GREENE. You are bound up with the Navy to put this proposition through, and there is one point I want information about, if I can get any information out of the amateurs, and if they have it they ought to give it to me, and that is as to the possibilities of the development of trade. That is what this committee is for. This committee is not a naval committee. This committee is for the development of trade and business, and we have got an immense—not a very immense merchant marine—but a merchant marine at an enormous cost. That is the immensity of it. We have got a small merchant marine, hardly worth mentioning, at an enormous, outrageous cost, and I want to make use of that merchant marine if we can. I do not think we can until we do something about it in the way of law, out of this committee, to make it possible to use the merchant marine. We can not use it in its present state, because we are distanced by Japan and by England and by every other country in the world, and what I want to get at is some information out of some of you as to the development of trade and as to whether the Navy Department is in any respect interested, and, if they are interested, where they have ever had any experience in trade. Perhaps the few men you have referred to who have been in the wireless and who are now at work in the Navy have some broad ideas about the expansion of trade. I am a great believer in the expansion of trade, and I want to get something to show that this bill means expansion of trade. It means contraction of trade, as I understand it, and I want to see if I can get your idea as to that.

Mr. MAXIM. I am sorry, sir, but I do not feel myself competent to answer that.

Mr. EDMONDS. Mr. Maxim, will you go a little deeper into this power input: that is, whether limiting the power input to one-half kilowatt, in case of amateur stations within 100 miles of the Atlantic or Pacific Ocean is a satisfactory situation.

Mr. MAXIM. I think it is; yes, sir.

Mr. EDMONDS. You have had 1 kilowatt up to the present time?

Mr. MAXIM. Yes, sir.

Mr. EDMONDS. They have now reduced it to one-half?

Mr. MAXIM. Yes, sir.

Mr. EDMONDS. Will that answer all the purposes of the amateur.

Mr. MAXIM. Yes, sir; I think it is a reasonable request. I think if we amateurs verge on the greedy, we are just laying up trouble for ourselves in the future. If you will limit us to one-half kilowatt, I consider it a very healthy condition, and we will soon do with one-half kilowatt what we were formerly doing with 1 kilowatt.

Mr. EDMONDS. Then, do you approve of this one-quarter kilowatt within 5 miles of a Government receiving station?

Mr. MAXIM. That is unfortunate, because a case has been brought to my mind of stations in the interior where by no possibility could distress signals from the sea be interfered with, and I should think that would be worthy of a little further consideration. I confess that in the beginning we had not thought so much about those inte-

rior stations, and I would like to hear from some of the amateurs who live in the interior on that subject.

Mr. EDMONDS. Is there any necessity of one-quarter kilowatt within 5 miles of a Government receiving station?

Mr. MAXIM. It might be, sir. If a tug at sea were in distress and called with its short wave length, which it would have to use, and some amateur within 5 miles was using one-quarter kilowatt, it might be he would cause interference with that tug. It is barely possible he would be culpable, and we do not want the amateur to be in the position of asking for more than he really ought to have.

Mr. EDMONDS. Suppose a naval officer was living at Lakewood, N. J., or some place just a little inshore on Long Island, and had a receiving station, not a sending station, then you would have to reduce your power if you were near him, because that is what this says here.

Mr. MAXIM. Yes, sir. Did you say a naval station or naval officer?

Mr. EDMONDS. It would be a Government receiving station, because that naval officer lives in a Government house.

Mr. MAXIM. If evasion or advantage is taken of us in a thing of that kind, then we are opposed to it.

Mr. EDMONDS. Do you not think it would be a great deal better if it said a Government station, describing the station?

Mr. MAXIM. It might be well to do that; yes, sir.

Mr. EDMONDS. A Government naval station, we will say.

Mr. MAXIM. That might be.

Mr. EDMONDS. But even at that, an officer's house would be so considered.

Mr. MAXIM. If an officer's private house—

Mr. EDMONDS (interposing). You gentlemen might interfere with an officer keeping account of his social engagements over the telephone.

Mr. MAXIM. Then we are against that.

Mr. HUMPHREYS. That would not be a Government receiving station, would it, Mr. Edmonds? That would be a private receiving station. The man occupying the house might be an officer in the Navy, but that would not make it a United States Government station.

Mr. EDMONDS. We pay the rent of the house, and it seems to me it would become a Government receiving station.

The CHAIRMAN. Do you know of an instance like that?

Mr. EDMONDS. I can conceive of that being possible.

The CHAIRMAN. But you have not any knowledge of anything of the sort?

Mr. EDMONDS. No; because the Navy Department has never had it before.

The CHAIRMAN. If an officer of the Navy had a receiving station in his home, would that be a Government station?

Mr. EDMONDS. If the Government owns the house or pays rent for the house and the Government pays for the apparatus, I presume it would be.

Mr. HUMPHREYS. If we undertake to define what a radio station is and what an experiment station is, that would not be possible, and it might be advisable, according to your suggestion, to define what a Government receiving station is.

Mr. EDMONDS. That was my idea, and I wanted to get your idea about it and to get exactly what this meant. I want also to call your attention to the fact that the present law for an amateur calls for the sending of 25 letters per minute; for a second-grade commercial operator it is 60 letters, and yet in this amendment the Navy is asking for 75 letters per minute.

Mr. MAXIM. Yes; I was under the impression that it was the same as for a second-grade commercial operator.

Lieut. COOPER. It was the understanding that this was to be the same as for a second-grade commercial operator, and I misunderstood Mr. Terrell the other day, and this amendment should be made the same as the requirement for a second-grade commercial license.

Mr. EDMONDS. Do you not think that is even too much for an amateur?

Lieut. COOPER. I will go back on the stand if necessary; but I simply wanted to say at this time that it should be the same as second-grade commercial license.

Mr. MAXIM. That was the intention. Then this should be 60 letters per minute.

Mr. SAUNDERS. I believe you are devoted to the work of invention—that is your profession, is it not?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. And have taken up in that connection this particularly fascinating art of the wireless and speak with some authority as an amateur in connection with the work you have done in that line?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. I want to ask you this question with respect to the commercial development of the wireless: As to point-to-point use within what I will call continental United States, do you think there is a future along that line for domestic use and domestic transmission of domestic intelligence within the United States itself—used between stations as between cities or between concerns, with a chain of business houses who want to use it in a private way? Is there a field for possible useful development along that line in the United States in competition with the telephone and the telegraph?

Mr. MAXIM. I understand your question to be this: Is wireless as you describe liable to compete with existing telephone and telegraph business?

Mr. SAUNDERS. Is there a future for it if allowed free scope of development?

Mr. MAXIM. I hardly think there is. Most of our business messages must be strictly secret, because they involve questions of price and business policy, and I should think that the radio communication in continental United States would not lend itself to business as well as the telephone or telegraph lines.

Mr. SAUNDERS. That is not by reason of inherent defect in the apparatus, but because you think that the messages would be of a character that would not want to be transmitted by a medium which admitted of listening-in universally?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. I understand that you think that would limit it.

Mr. MAXIM. That is one cause for my judgment; and the other is that radio at this stage of the game is dependent upon the weather and the season.

Mr. SAUNDERS. It is entirely conceivable that with the development of the art that that, like many other difficulties, will be removed?

Mr. MAXIM. Yes; it is one of the things we are struggling very hard to accomplish.

Mr. SAUNDERS. You are working on it now?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. With that out of the way any physical or scientific difficulty would be removed, and it would be a question just to what extent the people in private business would use the system for purposes of communication.

Mr. MAXIM. Yes. We have instances of the Goodyear Rubber Co., at Akron, Ohio, which communicates with its branches or did communicate with some of its branch houses by radio, and the instance of John Wanamaker communicating between his New York and Philadelphia stores.

Mr. SAUNDERS. Then it was the possible development for that use that I inquired about.

Mr. MAXIM. It indicates it is at least used, with this opportunity to enlarge.

Mr. SAUNDERS. Can you conceive that if the amateur is restored to his prewar status, particularly having in mind the developments that have occurred during the period in which he has been shut out, that there can be any possible danger from the commercial interests or to the national security of the country?

Mr. MAXIM. There can be no danger from the amateur if the law is enforced.

Mr. SAUNDERS. And, again, now with respect to the development in this field: Of all the fields of possible discovery is not this one in which the very greatest opportunity ought to be given to every one by reason of the fact that the fascination of this field and the appeal that it makes to the inquiring, intelligent mind?

Mr. MAXIM. Absolutely; yes, sir.

Mr. SAUNDERS. Then nothing ought to be done, in your judgment, as a matter of broad policy, to throw over or to restrict the very largest possibility of inquiry and development in this particular field of development and discovery?

Mr. MAXIM. Absolutely; no, sir.

Mr. SAUNDERS. Just to put this in the record: It has been developed before—in these high-power transmitting stations they use a wave of very great length, and no development, however great, no number of operators of an amateur character, however large it may be, operating under any system of sensible regulations that may be provided can interfere with the work of these high-power stations?

Mr. MAXIM. No, sir.

Mr. SAUNDER. As I understand from the answer you gave a moment ago, it is just a physical impossibility?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. What is the longest wave length that the amateur, with the instruments that he has to use, could send?

Mr. MAXIM. Transmit?

Mr. SAUNDERS. Yes; transmit or send, having in mind the ordinary amateur instruments.

Mr. MAXIM. It might be that an amateur could get up as high as 1,000 meters. It would be a rank infraction of the law. He is only allowed 200 meters, but he might be able with his chicken coop far enough away from the house to get up to 1,000 meters, but that would be a very long wave for him.

Mr. SAUNDERS. You think with some of the crude apparatus you speak of so many of them using he might get up as high as 1,000?

Mr. MAXIM. It might be that he could get up to 1,000. The long-distance stations that you speak of operate on wave lengths in excess of 10,000.

Mr. SAUNDERS. I am developing the facts in the matter. With these very great wave lengths, you say would be 1,000—

Mr. MAXIM (interposing). That would be the very highest I could imagine for an amateur.

Mr. SAUNDERS. Let us presuppose that all the conditions were exceedingly favorable for him to get up to such a length as that—1,000—would that interfere with stations operating with wave lengths of 10,000 meters?

Mr. MAXIM. No, sir; absolutely no.

Mr. SAUNDERS. So that scientifically the danger of interference between the amateurs, however much their operations may be developed, and these high-power stations is practically excluded?

Mr. MAXIM. Yes, sir.

Mr. GREENE. I would like to ask one question.

The CHAIRMAN. Right in that connection, Mr. Greene, if you will allow me, I was going to ask, How about the use of a wave length exceeding 200 meters interfering with the wave lengths necessary for ship-to-shore business in the saving of human life?

Mr. MAXIM. The ship wave length is 600 meters, and the amateur is allowed 200 under existing law. You see there is a wide difference.

The CHAIRMAN. But we have got to keep within limits in the use of wave lengths less than that necessary for ship-to-shore business?

Mr. MAXIM. Yes, sir; that is a reasonable request to safeguard life at sea.

Mr. SAUNDERS. He would just have to violate the law, as I understand, if he got up to a wave length that would interfere with that ship-to-shore business?

Mr. MAXIM. Oh, yes, sir.

Mr. SAUNDERS. This amendment which is proposed here, which has the sanction now of the Navy Department, would not keep him from violating that law, yet they seem to be satisfied with that amendment? He could still violate the law; the amendment would not stand in his way.

Mr. MAXIM. If he intended to violate the law, I do not think any amendment would stop him.

Mr. SAUNDERS. So that possibility that some trouble may be caused by violation of the law exists as well under this amendment as it would under the prewar conditions?

Mr. MAXIM. Of course.

Mr. SAUNDERS. And yet they are satisfied to take the chances under this amendment for the future?

Mr. MAXIM. Yes, sir; it is the best we can do to pass a law and endeavor to enforce those laws.

Mr. SAUNDERS. I do not know that this is exactly a scientific question. It may be an estimate of what we may call probabilities, Mr. Maxim, but speaking broadly, with a system of amateurs rigidly regulated by law with sufficient power behind it to enforce it and cut down to a maximum wave length of 200 meters, do you regard it as a matter to be seriously considered—the question of possible interference by such a system as that with the ship-to-shore communications?

Mr. MAXIM. No, sir; I do not.

Mr. GREENE. What I wanted to ask was this question: When you get away from the shore, get where you would not possibly have any trouble with the ship-to-shore stations, in the central part of the United States, whether or no there would be more possibilities of development of the wireless in ordinary trade there, and would that be possible without any interference with the Navy or anybody else?

Mr. MAXIM. No, sir; if you get into the interior you are getting away from the seacoast.

Mr. GREENE. Could there not be an amendment put into this bill to provide for an extension along that line, independent of striking at amateurs? We want to make this bill so as to have it of some use. We want any advantage we can get from it; we want to broaden out everything; we do not want to narrow the proposition. That is an objection I make to the bill; that it narrows the proposition too much. I want to broaden it out, even if the amateurs enlarge their possibilities or anybody else who has sufficient brains to enlarge its possibilities. I do not want to have the brain crushed out of it by a dynasty that becomes like autocracy.

Mr. HADLEY. If I understand your statement, Mr. Maxim, as between the amateur and the ship to shore there is no conflict under present law, if enforced?

Mr. MAXIM. That is right.

Mr. HADLEY. If this bill is passed, so far as you are concerned, the situation is satisfactory?

Mr. MAXIM. It has been proven by the last five years of experience.

Mr. HADLEY. Then this proposed amendment which is offered by the amateurs is merely offered for self-protection to reconcile the difference between the amateurs and the proponents of the bill?

Mr. MAXIM. Yes, sir.

Mr. LEHLBACH. The regulation of the amateur business in the past, before the war broke out, when the amateurs were operating, was in the hands of the Department of Commerce?

Mr. MAXIM. Yes, sir.

Mr. LEHLBACH. And the relations between that department and the amateurs were cordial and satisfactory?

Mr. MAXIM. Yes, sir.

Mr. LEHLBACH. Have the amateurs any preference to express as to whether they care to continue under the Department of Commerce, or would they be agreeable to being transferred to the Navy Depart-

ment, with whom they have not been in contact as they have been with the Department of Commerce?

Mr. MAXIM. My judgment leads me to answer that by saying that they would like very much to go back to their "old love." [Applause.]

Mr. SAUNDERS. One question, Mr. Maxim, which has been suggested by others asked: With respect to this possible commercial use, what I would style the internal commercial use of wireless in the United States, as, for instance, two concerns, one located in Washington here and the other in Lynchburg, in my State, where they have set up a wireless apparatus for the purpose of communication, they would use the same length of wave for that purpose as the amateur, would they not, or they could be required to use the same wave length?

Mr. MAXIM. Why, no; I think they would be entitled to use the ship wave length. If they were restricted to that, they could cause no interference with any Government commercial station operating on the allowed commercial wave length.

Mr. SAUNDERS. And having in mind your testimony as to the wave length, as stated to you by the gentleman whose experience you used by way of illustration, a wave length of 200 meters would be enough to allow for very considerable commercial development of the wireless—I mean scientifically speaking?

Mr. MAXIM. Scientifically, it would, but not commercially.

Mr. SAUNDERS. You would require a greater wave length?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. Could that wave length be increased so as to be commercially feasible and still below the ship-to-shore wave length?

Mr. MAXIM. There is a well-known distance between 200 meters and 600 meters.

Mr. SAUNDERS. You mean you can go all the way up, for instance, to 500 meters and still be outside of interference with the ship-to-shore communications?

Mr. MAXIM. At 500 meters both stations must have quite efficient apparatus because they are getting close together, you see.

Mr. SAUNDERS. Yes; but they would still be easily outside a wave length that would interfere with the ship-to-shore communication?

Mr. MAXIM. Yes, sir; those 500 meters would not interfere with 600 meters if the apparatus was efficient.

Mr. SAUNDERS. What is the relation between wave lengths and the possible distances over which they may be heard; for instance what is the range, under favorable conditions, of the 200-meter wave length on land?

Mr. MAXIM. Why, the 200-meter wave length has certain physical characteristics which make it impracticable as a regular thing to cover any distance.

Mr. SAUNDERS. That is what I want to bring out, the effects.

Mr. MAXIM. Yes, sir; 200 meters is not sufficient to go any distance, as a regular thing.

Mr. SAUNDERS. I will put it this way, to get down to a concrete illustration: Here is Washington and Baltimore. Would a 200-meter wave length between these two cities be available for every-day commercial use?

Mr. MAXIM. No, sir.

Mr. SAUNDERS. You need a greater wave length than that?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. That is about 40 miles?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. For the purposes of satisfactory communication between two points, between cities that distance from each other, having reference to day-in-and-day-out weather conditions, what would be the required wave length?

Mr. MAXIM. The practice in the past has been to make it 600 meters.

Mr. SAUNDERS. You require 600 meters for a distance of 40 miles?

Mr. MAXIM. Yes, sir. The wave length which we are limited to is almost an experimental wave length; it is not a practical wave length for the conduct of business.

Mr. SAUNDERS. Six hundred meters would cover, you said, that distance of 40 miles. How much more than 40 miles could that be satisfactorily used for?

Mr. MAXIM. Six hundred meters?

Mr. SAUNDERS. Yes.

Mr. MAXIM. Well, now, the question is one of power. If you used a half kilowatt, or 1 kilowatt, or 2 kilowatts, for instance, 2 kilowatts would transmit 600 meters farther than 1 kilowatt.

Mr. SAUNDERS. When you say "Use more power" in your transmission, with respect to wave length, it does not make any more capable of interference with the wave lengths above it, does it?

Mr. MAXIM. No, sir; power does not change wave lengths, necessarily.

Mr. SAUNDERS. And does not increase the interference?

Mr. MAXIM. No, sir; interference is a function of wave lengths, not power.

Mr. SAUNDERS. Then, using a wave length of 600 meters for commercial purposes, you increase the range, as I understand, of your wave length and therefore its capacity for commercial use is just as you put more and more power behind it?

Mr. MAXIM. It has that effect, sir, but you have not expressed it quite scientifically. Let me try to explain it this way. Usually on a 200-meter wave length, where the waves are very close together, they say that it has "to hit it" so often that it loses a lot of its efficiency before it gets there; whereas with 600 meters it does not have to take so many steps or does not have to hit it so often, and when it arrives it is stronger; that is a very homely expression. [Laughter.]

Mr. SAUNDERS. This is a homely committee, and we want to get information in a homely way. [Laughter.] But, still, with respect to the facilities and satisfactory character of its use, you can appreciably increase the sending radius, I will say, of that 600-meter wave length by advancing the power that is behind it?

Mr. MAXIM. Yes, sir.

Mr. SAUNDERS. Without suggesting 200 meters, or 40 miles, as a reasonable limit, with respect to that 600-meter wave, if you put enough power behind it, what would be the distance over which that could be reasonably used and satisfactorily used?

Mr. MAXIM. Six hundred meters at sea?

Mr. SAUNDERS. I mean on land.

Mr. MAXIM. Six hundred meters on land and using a 3-kilowatt, shall we say?

Mr. SAUNDERS. Yes.

Mr. MAXIM. I suppose it could be counted upon to transmit a great deal of business a matter of 250 or 350 miles.

Mr. SAUNDERS. All of the information given in these answers are in reference to present conditions in this art; it is the hope, I suppose, of the men who are working on it that any day you may see developments, arrive at the perfection of devices which would increase all of these ranges and the certainty of transmission, receiving, etc.; that is part of the development which you are all working on, is it not?

Mr. MAXIM. Yes, sir; a great many of us amateurs have already partly developed inventions which will do just what you say.

Mr. SAUNDERS. And the very obvious reason that you want the freest opportunity given to the work of every one along these lines is that you may hasten the day in which these improvements will be secured?

Mr. MAXIM. That is the burden of my mind.

Mr. GREENE. What is the reason the ship-to-shore stations can not be used with more than 600 wave lengths and therefore leave more space below; instead of narrowing it, enlarge it for the development of business generally? This is going to be a business proposition, not a naval proposition alone. Why not broaden its width and put the Navy up higher than the 600 wave length? Why should the Navy desire to come down on that low level when they do not need it? Is there not some zone between these high-power stations? Is there not a greater opportunity than for them to use the radio at 600 wave lengths which will shut out the ordinary individual or the business men from using radio, which it is desired to develop? Why can they not go higher than 600 wave lengths and not be interfering all the time? That is the situation as I gather it here. They would be better off, and there would be less trouble if they use the higher wave lengths.

Mr. MAXIM. They already are higher; it goes as high as 16,000 meters.

Mr. GREENE. Oh, yes; they can go higher; but they kept down to 600. They want this 600-wave length, as I understand it.

The CHAIRMAN. That is low now. We fixed that in this committee in 1912.

Mr. GREENE. Yes; I understand.

The CHAIRMAN. We fixed the limitation.

Mr. MAXIM. The limitations were very wisely fixed, if I may say, in the judgment of amateurs.

The CHAIRMAN. The committee thinks so.

Mr. GREENE. I am not talking of the amateur end of it; I am talking of these ship-to-shore stations, those at 600 meters. That is correct, is it not?

Mr. MAXIM. Merchant marine, I think, principally, sir; the Navy uses a longer.

Mr. GREENE. I know; but the Navy bought up these ship-to-shore stations, and have them under their control, and they are going to develop them with the merchant marine. They bought these from the Marconi Co. and intend to use them. Now, they are in the way of further development above this 200-wave length that you can use in

the amateur business, and we want to get at something between them. Why can not they get up higher and use it on ship to shore, say, higher than 600, without damage to anybody and with benefit to themselves?

Mr. MAXIM. I do not know that I can give those reasons exact enough, but I do know that the records of the hearings before this committee when the law of 1912 was passed will show that reason, sir.

Mr. GREENE. We may have grown some since 1912. I thought there might have been development and that we would know something more about it now.

Mr. MAXIM. I do not know those reasons. I was wondering why the Navy stepped up or down or over 600 meters. I do not believe I am competent to answer that.

Mr. EDMONDS. I think that was agreed to by the international conference.

The CHAIRMAN. No; that was agreed to by the commercial interests—the Navy, the merchant marine interests, and the amateurs, all around—and it has proven very satisfactory.

Mr. BANKHEAD. Mr. Maxim, can you tell approximately how many wireless operators there are in employment in the United States—I mean, using that art as a regular means of livelihood, in the Navy and in commercial pursuits?

Mr. MAXIM. I would have to guess at that; I do not know. There must be upward of 4,000 amateurs or ex-amateurs.

Mr. BANKHEAD. Referring to your observation of a few moments ago, in answer to Judge Saunders's question, that you did not think there was very much chance for continental commercial development along this line, the possibilities, then, for cheaper employment as a permanent means of livelihood by wireless operators will be necessarily limited to the scheme now in operation, to a large extent?

Mr. MAXIM. So far as I can see now.

Mr. GOODWIN. What is the greatest distance that wireless messages can now be sent successfully?

Mr. MAXIM. I presume you refer to those stations—

Mr. GOODWIN (interposing). Any station. What is the greatest distance any message has ever been sent successfully?

Mr. MAXIM. You are taxing my memory, but I have heard these experts say that they have heard here in Washington the radio station at Cavite Bay, Manila, Philippine Islands, which must be a distance approaching 7,000 miles.

Mr. SAUNDERS. Mr. Maxim, it is a rather interesting matter to me that Mr. Greene referred to. They have agreed upon a wave length for ship-to-shore communication, but there was no particular logic in the wave length they agreed on; it was just that it was universally agreed on. It can be pushed up, we will say, to 1,200 meters, and it was universally agreed it would be just as satisfactory for these purposes, I suppose, at the present agreed wave length, or would it not?

Mr. MAXIM. Oh, yes. The longer the wave length the better the conditions for long-distance work.

Mr. SAUNDERS. Was this wave length agreed on at the time the agreement was made one that was thought to be the best at that time in view of the then state of advancement of the art or was it this universal acquiescence in that particular wave length without any consideration?

Mr. MAXIM. I think it was general acquiescence. Judge Alexander would know more about that than I do.

The CHAIRMAN. I will read Article II of the service regulations annexed to the International Wireless Telegraph Convention of London. (Reading:)

ART. II. *Wave lengths*.—Two wave lengths, one of 300 meters and the other of 600 meters, are authorized for general public service. Every coastal station opened to such service shall be equipped in such manner as to be able to use these two wave lengths, one of which shall be designated as the normal wave length of the station. During the whole time that a coastal station is open it shall be in condition to receive calls according to its normal wave length. * * * In addition, each Government may authorize in coastal stations the employment of other wave lengths designed to insure long-range service or any service other than for public correspondence established in conformity with the provisions of the convention under the reservation that such wave lengths do not exceed 600 meters or that they do exceed 1,600 meters.

In particular, stations used exclusively for sending signals designed to determine the position of ships shall not employ wave lengths exceeding 150 meters.

Of course, we had that in view in framing the act of 1912.

Mr. SAUNDERS. That just gives the agreement; that does not answer the question I was asking, which was whether there was acquiescence in that particular wave length in order to get a universal agreement rather than that particular wave length was suggested as the one best wave length of all the other wave lengths that might be suggested for the purposes they have in view, and I understand the witness to say it was rather an universal acquiescence to get an agreement than that scientific necessities suggested that wave length. So far as you know, Mr. Maxim, I understand you to say that there is no reason, scientifically speaking, why that wave length could not be advanced to 1,000 meters or 1,200 meters and be fully efficient for all the purposes for which it was intended.

Mr. MAXIM. Yes, sir; it could be.

Mr. SAUNDERS. If there was that universal agreement on the part of the nations in that wave length?

Mr. MAXIM. That is the whole thing, universal agreement.

Mr. SAUNDERS. And as that advanced you would get, of course, farther and farther away from any possibility of interference by domestic development along such lines as I have indicated?

Mr. MAXIM. Precisely; yes, sir, you would.

The CHAIRMAN. That would mean the equipment of ships with a higher power station than they have now, would it not?

Mr. MAXIM. Not power; it would reduce wave lengths.

The CHAIRMAN. Would they not be required to use higher power to use the greater wave length?

Mr. MAXIM. No, sir.

The CHAIRMAN. Would a 1-kilowatt station use the same wave length as a 2-kilowatt plant?

Mr. MAXIM. Yes, sir. I might say that one-eight kilowatt would send on any wave length and 10 kilowatt could send on any wave length.

The CHAIRMAN. What would be the reason why a 10-kilowatt plant should be used rather than the 1-kilowatt plant?

Mr. MAXIM. Distance.

The CHAIRMAN. Very well. The lower—the 600-meter service—for ship to shore and most purposes for saving human life is used; is that true?

Mr. MAXIM. I think, Judge, if you will go back in the discussions, I think we said that the average distance between the masts of the average ship makes it such that 600 meters are the easiest wave lengths to get and fits the average ship the best. I think that was the thing which governed in arriving at 600 meters.

The CHAIRMAN. What we wanted was some standard that would be practicable.

Mr. MAXIM. Yes, sir.

The CHAIRMAN. And that could be used by the average ship.

Mr. MAXIM. Yes, sir.

The CHAIRMAN. And in the interest of saving human life.

Mr. MAXIM. Yes, sir.

The CHAIRMAN. That is, the crews on small ships should avail themselves of this art in saving life as well as on the large ships which might carry the larger antenna.

Mr. HUMPHREYS. Mr. Chairman, is not this a fact, that the 600 wave length is simply used for calls on these ships, and, as a rule, as soon as they come in contact they shift to a different wave length to carry on their communications?

Mr. MAXIM. I think that is the practice among ships; yes, sir; because on entering New York harbor you can easily see there might be a great many ships wanting to communicate at the same time, and they have to arrange the signal between themselves which says, for example, "let us change to 500 meters."

Mr. HUMPHREYS. Or 1,500, or whatever it might be?

Mr. MAXIM. Whatever they agree on.

Mr. HUMPHREYS. So that they can then carry on the conversation on these ships with a very much longer wave length than 600?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. And the practice is they really use this 600-wave length very little?

Mr. MAXIM. Only enough to gain contact. You have got to be listening in on the universal pre-arranged wave length or you will not hear your call.

Mr. HUMPHREYS. As soon as you hear it you shift to some thing so that if somebody else wants to call, the 600-wave length will be available?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. I want to ask you some questions that were suggested to my mind by some of the other questions asked. Is it easy to locate a violator of the regulations among the amateurs? Suppose an amateur should begin to use 600 or 800 or 1,000, would it be easy to locate him so that he could be apprehended?

Mr. MAXIM. Yes, sir; there are records which show it has been done.

Mr. HUMPHREYS. So that there is no particular difficulty; in other words, it is not harder to locate a violator of this law than many other laws that we write upon the statute books?

Mr. MAXIM. Exactly.

Mr. HUMPHREYS. You did not seem to think this overland business *would ever develop* very much commercially, and one reason you gave

was the lack of secrecy; another was the matter of interference of the weather or the unfavorable weather conditions, as I understood it?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. Is that what you call static interference?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. From the way word was used here, I wondered what it meant.

Mr. MAXIM. Yes, sir; that means electrical weather disturbances.

Mr. HUMPHREYS. Have not some inventions already been made to eliminate that or lessen that static interference considerably?

Mr. MAXIM. Yes, sir; there have, very recently.

Mr. HUMPHREYS. And I suppose it is your hope and belief that in the reasonably near future other improvements will come that will reduce it, if not entirely eliminate it?

Mr. MAXIM. I feel absolutely sure of it; yes, sir.

Mr. HUMPHREYS. I would like to ask you about a part of your apparatus. I do not know what you call it, but I would call it a "reflector." I understand you have some sort of an instrument that you can attach to your sending machine that will direct the waves in certain directions?

Mr. MAXIM. Some of us thought we had that; yes, sir.

Mr. HUMPHREYS. I would like to know about it myself. Have you or have you not?

Mr. MAXIM. Some of us have very good evidence that has been presented indicating that they can establish the direction of their greatest power; by arranging the antenna they can make the greatest power go due east and due west and the minimum power go due north and due south.

Mr. HUMPHREYS. Some progress has been made along that line?

Mr. MAXIM. Yes, sir; there has.

Mr. HUMPHREYS. And I assume it is entirely right to say that all progress in that direction has not yet been made?

Mr. MAXIM. Oh, no.

Mr. HUMPHREYS. You spoke of an instrument that had been invented by an amateur named Armstrong, which you called the Armstrong regenerating circuit.

Mr. MAXIM. We call it the Armstrong regenerating circuit; yes, sir.

Mr. HUMPHREYS. Would it be possible, do you suppose, to describe that to us so that what Judge Hardy described as "a simple citizen" could understand it? [Laughter.]

Mr. MAXIM. That would be quite a question, but I will do my best. I have asked my fellow engineers not to smile.

Mr. HUMPHREYS. The purpose of this is not idle. I should perhaps have waited until the hearing was over, and then asked you personally to describe it to me. But in order to show to those who care to read the record that the amateurs are really doing an important work along this line. I think it desirable, if you can put this in words, so that the average Congressman, who is a "simple citizen," can understand, it will help them.

Mr. CHRISTINE. May I make a suggestion that Mr. Maxim be given a blackboard and chalk? I believe he could make this whole subject of wireless as plain to this committee as to himself if he had a blackboard, particularly when he enters upon the subject of regener-

ating circuit. It will then be very difficult for you to understand unless he does it by means of a diagram.

Mr. MAXIM. Might I suggest that I try the words first? I think I can convey the idea by words so that it will be satisfactory to you.

Mr. Armstrong in his experiment disclosed the fact that we had not before understood as thoroughly as he that in a closed bulb, like an incandescent lamp, rigged up in a certain way, the energy will go across from one member to another, and can be made to pull a trigger, if you please, like the trigger of a gun, and thereby liberate considerable energy which you have here [illustrating] in any quantity you want. In other words, Mr. Armstrong discovered that this very feeble, infinitely feeble, electrical impulse, which comes in from points thousands of miles away and is led to your ears, is too feeble of itself to make an audible sound, but it is not too feeble, according to his arrangement, to "pull a trigger."

This is not a scientific explanation; but it is what you want, I think. It was not strong enough to render itself audible but it was strong enough to pull the Armstrong trigger, and when the trigger was pulled it liberated this energy in this little battery here [illustrating] and then he had something which would hear and his device made the inaudible audible. Does that convey the idea?

Mr. HUMPHREYS. Oh, yes; it is very clear to me and is as technical as I could understand it. If you went into it deeper I would not be able to understand it. It is very interesting, and I can see the great value of that. That was the invention of an amateur?

Mr. MAXIM. Yes, sir.

Mr. HUMPHREYS. There are others, of perhaps varying degrees of value, which are also the inventions of amateurs?

Mr. MAXIM. Yes, sir. I could not tell you any more than I have told you without violating confidence; but I know a great many inventions which will be brought out within a year or less time.

Mr. LEHLBACH. Is there not a device—called the heterodyne—which eliminates, in a large degree, interference from other messages excepting the one being received?

Mr. MAXIM. Yes, sir; that is a very great improvement in eliminating interference.

Mr. LEHLBACH. And the limit of development of that device has not been reached?

Mr. MAXIM. By no means.

Mr. LEHLBACH. In other words, so that interference from other messages in the air can be largely eliminated and in the future will be still more eliminated?

Mr. MAXIM. Just exactly; yes, sir.

Mr. WHITE. I would like, Mr. Maxim, to clear up something that is in my mind, or perhaps I should address my question to some of the older members of the committee, but, as I understand it, in this London convention the United States was a party either directly or by ratification?

The CHAIRMAN. We had delegates.

Mr. WHITE. And the United States was a party to this London convention. As I understand it, we bound ourselves to apply the provisions of the present convention to all radio stations. Then, under Article II, there is a provision limiting wave lengths, which provides *that two wave lengths*, one of 600 meters and the other of 300 meters,

are authorized for general public use. The question I want to ask is how, in view of that convention to which we are a party, can we engage in the use of this wireless by the Government for any smaller wave lengths, as this bill proposes. It is a matter I do not understand, and I would be glad to have the witness or somebody explain that.

The CHAIRMAN. I would suggest that we have representatives of the Navy here who will come back in rebuttal and take up and answer that question.

I will call attention to the hearing before this committee on H. R. 19350, in the last Congress, which were very full and complete, and I think it would be of interest to the committee to read the statement of Mr. Edwin H. Armstrong, electrical engineer and specialist in wireless receiving apparatus, and the inventor of this apparatus to which Mr. Maxim has referred, and in which he says, page 202:

I have invented the regenerative audion receiver, which is the best interference preventer that is known at the present time. It is used throughout the world in commercial and Government stations.

I take it for granted that the members who want to inform themselves will read it.

Mr. HUMPHREYS. I would like to ask the witness, if he cares to answer, this question: What is your opinion and the opinion of your organization on the proposition made by Mr. Nally the other day to have this matter regulated by a commission?

Mr. MAXIM. I should have to give that thorough thought. I had not thought of that. We had such very good regulation under the Department of Commerce that it would have to be pretty good to beat it.

Mr. GREENE. This is going into the Navy, not the Department of Commerce.

Mr. SAUNDERS. Mr. Maxim, one question in connection with the matter brought out by Mr. Humphreys in reference to the Armstrong invention: As I understand, that wave length comes in very feebly and pulls a trigger which releases stored energy, and that stored energy amplifies the feeble wave and makes it stronger; is that the way it works?

Mr. MAXIM. Exactly; yes, sir.

The CHAIRMAN. We will now hear Mr. Hamilton. [After a pause.] Gentlemen, I have just received word by telephone from the House that the presence of the members of this committee are desired on the floor.

Mr. EDMONDS. I have here a petition from a number of amateur operators which was handed to me by Henry A. Clark, Member of Congress from Pennsylvania, who asked whether we could have it placed in the record. It is from the radio department, Andrew Jackson School, Erie, Pa., and dated December 10, 1918, and is signed by seven members of the school.

The CHAIRMAN. We will be glad to file the petition for the information of the committee.

We will now take a recess, without objection, until 2 o'clock this afternoon.

(Thereupon, at 12.45 o'clock p. m., the committee took a recess until 2 o'clock this afternoon.)

AFTER RECESS.

The committee reassembled, pursuant to the taking of recess, at 2 o'clock p. m.

Mr. LEHLBACH. Mr. Chairman, in view of Mr. Maxim's interest in the Armstrong invention and the exposition of it given by the preceding witness, I thought it would be of interest to read what Prof. Pupin had to say about the invention, as it is found in the hearings held on the previous bill before the committee. This is what Prof. Pupin said, as it is found on page 158 of the hearings of January 18:

This young student by a simple transposition of circuits made the same audion 5,000 times as sensitive. With what result? With the result that everybody is using it to-day, and all the operating companies pay this young man a modest royalty. Not a very large royalty, because the operating companies are not making money—not much, anyhow. They can not afford to pay more than a very modest royalty. But it enables this young man to support his mother and two sisters. The United States Navy uses this invention more than anybody else. According to the information which an officer of the Navy gave to myself, they were using it since January, 1914. And they had it at this time—and this was a year ago—in something like 40 stations. They have not paid a cent to this young man, and they do not intend to. They all tell him, "You can go to the Court of Claims."

The CHAIRMAN. Here is what Mr. Armstrong said in the hearing of 1917, beginning on page 201:

Mr. GRIGGS. What is your business, Mr. Armstrong?

Mr. ARMSTRONG. I am an electrical engineer who makes a specialty of wireless receiving apparatus.

Mr. GRIGGS. Have you made any invention or discoveries in that field?

Mr. ARMSTRONG. I have invented the regenerative audion receiver, which is the best interference preventer that is known at the present time. It is used throughout the world in commercial and Government stations.

I would like to ask Mr. Maxim if that is the instrument to which he refers? Mr. Maxim does not seem to be here just now. I will ask Lieut. Cooper if that is the instrument.

Lieut. COOPER. That is the same one.

The CHAIRMAN. We will now hear Mr. Hamilton.

STATEMENT OF MR. FRANCIS F. HAMILTON, OF INDIANAPOLIS, IND., REPRESENTING THE HOOSIER RADIO CLUB OF INDIANAPOLIS.

Mr. HAMILTON. Mr. Chairman and gentlemen, I represent the Hoosier Scout Radio Club, of Indianapolis, and have recently been an Army instructor in the Signal Corps camp at Camp Purdue in Indiana. On December 1 that camp was discontinued, and so I came to Washington to work on this bill.

Mr. Maxim has covered very thoroughly the technical side of the subject as the amateur sees it, and I want to present a few facts further that he has not covered as thoroughly as I think it should have been covered.

We have been hearing about large things and money values running up into the millions of dollars. Now, the amateurs are here. We have small stations, and we are in the cents column instead of the dollar column, as far as the money goes. But you have heard the old saying "Take care of the pennies and the dollars will grow." So we say: "Take care of the amateurs and wireless will grow."

Mr. Chairman and gentlemen, I want you to get the point of view of the amateurs. We have been hearing about the Marconi Co. Each amateur is a little Marconi Co.; each man or boy is president, secretary, treasurer, owner, operator, and probably the inventor of his complete station. And what is he in business for? He is in business for profit, of course. It develops his mental side, his mechanical and electrical experience; his skill is developed in handling messages and tuning through static. I refer there to interference through storms. He is constantly gaining knowledge, as most amateurs do.

An ordinary amateur station may cost from \$3.50 up. Most of the amateurs spend from \$20 up to several thousand dollars for a complete sending station; they spend as much, sometimes, as several thousand dollars for wireless junk and apparatus. I put the word junk in there because there has been a lot of that sold to amateurs, and the amateurs have been imposed upon by some manufacturers putting out apparatus that is not worth putting on the market. We have been imposed upon by some of the apparatus of the German manufacturer which has been allowed to be sold on the market, and the amateurs were stung. Does not the amateur want a profit? Of course he does. Each small amateur is, as I said, a small Marconi Co., and he expects a legitimate profit.

If I may take the time of the committee, Mr. Chairman, I shall enumerate some of the profits. I have had many a father say to me, "My, I am glad Johnny is interested in wireless." I asked why? The father continued, "Why, we always know where Johnny is; he never runs around and gets into mischief. He is always here at home working." Is that not a profit to the community and to the family, and to Johnny? If I may digress here for a moment, I would like to tell you some of the actual facts that have come under my observation in regard to some of the little fellows down in the slum district in Indianapolis, who have been interested in wireless. I have been in some of their homes, and back in a dark corner this little fellow will be at work, using a little receiving outfit, the money to purchase which has been obtained by selling newspapers, or in a similar way. There he is off in that room listening to messages, hoping that some day he may have a sending outfit himself. That is a wonderful proposition, it seems to me, to see those little fellows working with so much enthusiasm and so much interest, little fellows whose fathers and mothers have had practically no education, interested in such a wonderful science as this. Their study and work is going to develop them and broaden their minds, and some of them will, in that way, get an ambition to go to college, and probably become radio engineers, as a few have already done, who have come under my instructions.

Many and many a boy who has become an electrical engineer has had a start in wireless. He learned the fundamentals when he was 15 or 16 years old, down in his wireless room.

My third point is this: In time of war where did the Navy look for operators? You can answer that as well as I.

My fourth point is this: It takes years to learn to be good at anything, any profession, if you please; to be a good lawyer, or a good doctor: that is even more truly the case with wireless telegraphy.

Imagine taking a bunch of farmers and trying to teach them wireless. I had some experience in doing that. Our first group of men were drafted men. They were selected by a selective system, and nearly all of them had been amateur operators before. Before they got through the course they were all good operators. They had the fundamentals and after they were taught how to handle the Signal Corps apparatus they were very good operators.

Our next group of men were drafted men, drafted promiscuously, according to number, without any idea of ever knowing anything about wireless. Most of them came off of farms, and we had these men under training for 13 weeks, and when they got through they knew less than when they started. That is the trouble in training men who do not have any incentive for this kind of work and who have had no experience. It takes men who have had some experience, such as the amateurs have had, two or three years to become an expert operator. There is one feature I want particularly to refer to, and that is that it is very important to the United States Government to have these amateurs coming on, and to have them in readiness in case of a national emergency such as we have recently passed through.

Mr. HUMPHREYS. There is not any special reason why a boy on a farm may not learn wireless as readily as a boy in the slums, is there?

Mr. HAMILTON. Absolutely not. I was raised on a farm myself, and I began my first amateur set on a farm, in the old woodshed.

Then, it is very profitable for Uncle Sam to have a lot of operators coming along all the time, if he needs them, and he will need them if we are going to have the great merchant marine the papers tell us about.

Another great profit to an amateur is the fostering of ambition. Many amateurs dream of the day when they may be on a large ship at sea operating a wireless station. With that in view, what is the chance of amateurs operating ship stations after they have fulfilled the requirements if this bill passes? Why, an amateur would have to join the Navy first and put himself under military authority in order to develop his commercial profession and ambition. I ask you gentlemen is that desirable, and will amateurs look upon this course as desirable? I do not believe they will.

Now, I want to say something in regard to the question of patents. I have been working on some patents myself, and I can give you my viewpoint in regard to patents.

The question of patents was so well defined on yesterday by Mr. Griggs that it is almost unnecessary for me to say much in addition. However, I want to point out that any one of these amateurs might stumble on some new, fundamental principle, as Mr. Armstrong did, that would revolutionize the development of radio, we will say, for example, in sending sets on ships. If this amateur should get a good patent, and we will presume he would, he could get capital interested in it, and that is not hard to do in these days, and he would have and should have the right to place his improved sets on ships. Under the United States laws I should think he should have that right, and they will want to buy the patents.

Mr. HUMPHREYS. What do you mean by having the right to place his apparatus on a ship?

Mr. HAMILTON. If you should get a patent on radio apparatus which would be a fundamental patent, you ought to have the right

to use that without going to the only bidder, who would be the Secretary of the Navy. There ought to be more than one bidder on that. In other words, if the Department of Commerce was operating a merchant marine, and the Secretary of the Navy was operating the Navy, you would have two departments competing, and then a third person might come along, and he might have some ships, and you would have another party to deal with. The point is that would give you another opportunity.

Mr. HUMPHREYS. If the shipowner is agreeable?

Mr. HAMILTON. If the shipowner is agreeable, yes; which he would be if the station only cost one-third what it generally would cost, and then the rentals could be less.

Mr. HADLEY. You want a broader market for the inventor?

Mr. HAMILTON. A broader market for the inventor than there would be if this bill should go through.

Mr. HARDY. Would there be any difference in the breadth of your market if a private monopoly controlled it?

Mr. HAMILTON. I should say there would not be so much in the breadth of the market as the opportunity to get the greatest amount of profit out of that particular invention. If you have half a dozen men all developing inventions and half a dozen people willing to take them, you are bound to get more money than if there are only one or two men.

Mr. HARDY. Suppose there was only one man, and that man represents a private monopoly.

Mr. HAMILTON. You would have to take what he gave you for it.

Mr. HARDY. Would it be any better if it was a private monopoly that if it was the Government?

Mr. HAMILTON. That is a question I could not answer, because I do not know what the private monopoly might be.

Mr. HARDY. If either the private monopoly or the Government were altruistic in connection with these things, they might help you?

Mr. HAMILTON. Yes.

Mr. HARDY. But, as a matter of experience, is the private monopoly more liberal than a Government monopoly to inventors?

Mr. HAMILTON. I should say so.

Mr. HARDY. Have you ever had any experience?

Mr. HAMILTON. I have not sold any patents, but that would be my feeling in the matter. If I go to the Government to sell a patent, there is a lot of red tape to go through with.

Mr. HARDY. And the Government is not interested in getting the last dollar out of your patent. Usually they are interested in the public welfare, while private interests would be interested in getting a profit. Is not that, to some extent, the difference between the two?

Mr. HAMILTON. The Navy Department is interested in the public welfare, and the private monopoly would be interested in their own welfare.

Mr. HARDY. In their own profits?

Mr. HAMILTON. Yes.

Mr. HARDY. The Navy Department would be interested in every improvement for the purpose of helping to protect life at sea?

Mr. HAMILTON. They certainly would.

Mr. HARDY. And prodded by Congress and by public sentiment, would they not be disposed to adopt every new invention that would help to protect life at sea?

Mr. HAMILTON. In the case of Appgar, that got all these messages from the German station, there were naval stations all around that, and they should have found out that there was a leak there, but they did not.

Mr. HARDY. I do not raise any question in regard to that. That is not a question that has anything to do with the marketing of your invention. You were talking about having a customer to buy your inventions, and you said you would rather have competitors for the purchase of your invention, that everybody would, if you had anything to sell. My point is if you had but one buyer, would he likely be more liberal with you if he was a private buyer than he would be if he was a representative of the Government?

Mr. HAMILTON. It seems to me it has been brought out that the Marconi Co.—that we will consider as a monopoly—paid Prof. Pupin a million dollars for a certain patent which he developed. I do not know whether the Navy Department has paid out any money at all for patents. If they have, I do not know about it.

The CHAIRMAN. Do you know of the Marconi Co. paying money for any patents except that one?

Mr. HAMILTON. No; I do not.

The CHAIRMAN. It is just absence of information on your part?

Mr. HAMILTON. Yes.

The CHAIRMAN. Your information is not based on very broad, accurate information?

Mr. HAMILTON. No; just on those two cases. I am trying to give it to you from my standpoint as an amateur.

Mr. HARDY. You never knew of a private monopoly not taking over any patents at all?

Mr. HAMILTON. Yes; I have in mind the case of the National Cash Register Co., but that was before the Sherman antitrust law was in effect, I believe.

We will say the improvement is such that a complete set would cost \$1,000 instead of \$3,000. Now, is not that an advantage to commerce, for the ship set rental would be less, and this amateur could, simply by competition, force a competing company to buy his sets or go out of business. Amateurs should have that right.

If I may say what I believe, I believe that in the future we shall see just such a thing happen, if the wireless business is not bottled and corked up by the Navy Department, as this bill proposes. I believe in the future we shall see this very thing happen, that due to the invention and improvements on ship sets and radio stations in the United States, that in three years there will be so much improvement that the old ones will all be scrapped and the new sets will be sold at a much cheaper price because of their efficiency, and the sets will not be so large and powerful as they used to be.

Mr. HARDY. You continue to speak of competitors having to go out of business unless they should adopt these new sets. Have you not heard the testimony here of Mr. Newell, who says that the purpose of his company is to secure a monopoly, and the probabilities are that some private enterprise will have a monopoly unless the Government does.

Mr. HAMILTON. Yes; I heard that testimony.

Mr. HARDY. Then where is the competitor coming in?

Mr. HAMILTON. I figure they will not be able to maintain a monopoly. I started with the supposition that the amateur would invent something which will revolutionize the ship stations, to begin with; with that supposition it would be necessary for either the Marconi Co. or some new company which might start up in competition with the Marconi Co. to buy those sets from this one firm.

Mr. HARDY. Will you tell me what likelihood there would be of a new company starting up, when it takes now many millions of dollars to get into the game?

Mr. HAMILTON. I do not agree with you on that.

Mr. HARDY. Do you believe a new company could start without—

Mr. HAMILTON (interposing). I am figuring on a manufacturing company selling the sets to the ship company. There might be a few people get together with a capital of \$5,000 or \$10,000 to manufacture the outfits.

Mr. HARDY. I am not talking about manufacturing the sets. I am talking about establishing a wireless system that would compete with this company. In other words, you have a vast monopoly of a wireless system operating in America and England and everywhere else. What chance is there for a competitor of that monopoly to start out and by buying better inventions, live? In other words, with your inventions, must you not go to the monopoly?

Mr. HAMILTON. I would make them come to me.

Mr. HARDY. How would you do that?

Mr. HAMILTON. Now, then, under this supposition the Marconi rental is now \$1,000 a year. If I could get up an invention which would cost half as much as their ship sets, that would reduce the rental. I would certainly get two ships to start with, to prove that this was satisfactory, and after I had done that—

Mr. HARDY (interposing). When your ships started out, how would they have shore stations to communicate with them?

Mr. HAMILTON. Under the law, we would have the right to communicate with the shore stations.

Mr. HARDY. You are sure that the privately owned monopolistic shore stations would cooperate with you?

Mr. HAMILTON. They would have to take the messages if we paid for them.

Mr. HARDY. Have you ever seen a private small enterprise root out a monopoly by means of patents or other methods?

Mr. HAMILTON. There were a good many firms mentioned this morning that have started from nothing and have grown to be pretty good-sized businesses in this country selling apparatus, and they have been up against the Marconi Co. and other companies.

Mr. HARDY. The Marconi Co. is not a manufacturing company, is it?

Mr. HAMILTON. Yes; it is the largest in the world, and the other companies have sold a lot of apparatus.

Mr. HARDY. As a manufacturer, has the Marconi Co. ever assumed proportions that looked like monopoly?

Mr. HAMILTON. Not to my knowledge.

The CHAIRMAN. They manufacture the apparatus on which they hold patents?

Mr. HAMILTON. I think so, and I think some of those patents are used by other firms.

The CHAIRMAN. They have to get a permit from the Marconi people to do that?

Mr. HAMILTON. I do not know about that. That may be true.

It might be and is not unreasonable to believe that men on this committee might get interested in wireless and become amateur operators. If that were true, I wonder if they would like to be under the Navy Department or under the Department of Commerce? We are of the unanimous opinion that we would much rather be under the Department of Commerce.

Right here I would like to say a few words in regard to the amendment in section 3 of the proposed bill offered by the Navy Department for the purpose of satisfying the amateurs. The amendment, so far as the fundamental principle involved is concerned, is satisfactory to the amateurs. But I want to go on record as saying that I do not see any valid reason why the present law should be changed if the law is enforced.

Mr. HADLEY. Then the corollary of that would be, from your point of view, that even if this law be enacted an amateur should be excepted from its provisions rather than be regulated by the terms of that amendment?

Mr. HAMILTON. If this bill should go through the way it is written, if they leave us the way we are it would be satisfactory.

Mr. HADLEY. You think they should be excepted from its provisions?

Mr. HAMILTON. Yes.

Mr. HADLEY. It has been represented to the committee that this amendment represents an agreement which is satisfactory to both sides.

Mr. HAMILTON. Mr. Maxim represents a certain number of amateurs. As I told you at the beginning, each amateur is a little company of his own, and each man will have his own ideas. I think Mr. Maxim said himself this morning that if it were possible he would like to see the law left as it is, but if it were not possible to do that, he would agree to this amendment.

Mr. HADLEY. I think that was the effect of his testimony.

Mr. HAMILTON. We agree with that statement in his testimony.

Mr. BESH LIN. Then there is no agreement among the amateurs as to their policy?

Mr. HAMILTON. No absolute agreement, except that I have a few telegrams from the western associations agreeing to the points in the amendment that they object to.

Mr. BESH LIN. What proportion of the amateurs do they represent?

Mr. HAMILTON. I should say these telegrams represent 400 or 500 of the western amateurs. Both of them come from the Chicago association. I represent the Indianapolis association. There are a few points of this amendment I wanted to bring out in regard to the way it is written. If this amendment goes in it will probably go in the way it is written, and it is not satisfactory the way it is written. In the definition of the word amateur station it says, "The term amateur station means a station used for private practice or experiment in radio communications for profit." I tried to bring out that we only operate our stations for private profit. I would like to see that cut

out; that is, the word after the word communication, so that it would read, "The term amateur station means a station used for private practice or experiment in radio communications." The other part is not necessary, and it is misleading.

The CHAIRMAN. Do you want the amateur stations operated for commercial profit?

Mr. HAMILTON. Yes, sir; I do want them operated for profit. We have been doing that.

The CHAIRMAN. For commercial profit?

Mr. HAMILTON. Yes.

The CHAIRMAN. And receive so much for messages sent and received?

Mr. HAMILTON. It says here "practice or experiment in radio communications." Under the 1912 law we can not receive money for transmitting messages. We do not want to do that. The profit we want is in the experimental end of it.

The CHAIRMAN. I think we will all agree to that, that we want to give you that opportunity. When you want to strike that out we have the right to infer that you want to engage in commercial business for profit.

Mr. HAMILTON. We do as experimenters.

The CHAIRMAN. Then you say you do want to do that?

Mr. HAMILTON. Yes. We do not want to get any money for transmitting messages. The only profit we want to get is on the experimental end.

Mr. BESH LIN. Is any charge made for instructing others who may want to learn the art?

Mr. HAMILTON. I have been conducting a radio plant for a number of years and have never charged a cent. I have been doing that through the Boy Scouts. Here in Washington there are a lot of schools which charge \$75 a term for the instruction of amateurs. We do not do that.

Mr. HARDY. There would be no objection to a charge for instruction?

Mr. HAMILTON. I should not think so, but it has been my pleasure to do it free of charge, because I felt I was doing my duty. I have no way of knowing just what the Navy Department had in mind when they proposed this amendment, but I do know that when this bill was drafted it was so written that amateurs were put clear out of business. If you will look at the amendment in the light that each amateur is a small company operated for gain or profit to its owners, you will see that the Navy Department's definition is "The term 'amateur station' means a station used for private practice or experiment in radio communication and not operated for profit in either sending or receiving signals." Just see what it says, "Not operated for profit." Webster says profit means "Any increase of goods from labor or exertion, comprehending the exposition of anything valuable, intellectual, or corporal." In this light we are cut out by the very definition of the word 'amateur.' I say cut the amendment short after the word communication. It will be sufficient, and no question will arise, as I see it.

There is another point in this amendment that I would like to call your attention to. The amendment says: "That when such amateur stations are licensed for receiving purposes only." Under the present

law we are not licensed for receiving purposes. That is misleading. It also says "No operator's license shall be required for the operator in charge of or operating such stations." There is an apparent contradiction there. It says when a license is required no license shall be required.

Mr. EDMONDS. Under the new law you would be required to have a license for receiving stations, and that amendment would follow that provision. It requires all receiving stations to be licensed, and if that is the case this amendment would simply follow that provision.

Mr. HAMILTON. Then I will stand corrected on that.

Mr. EDMONDS. Is there any particular objection to licensing a receiving station?

Mr. HAMILTON. I think it would be a good thing provided there was Government money to do that.

Mr. EDMONDS. As long as they made no charge for it?

Mr. HAMILTON. I mean if they provide an organization here at Washington to license receiving stations, because then everybody would be on record.

Mr. EDMONDS. Of course, they do not require any examination under this amendment?

Mr. HAMILTON. Absolutely none. I believe the Navy Department will stand corrected on this 15-word a minute proposition, or the 75. I got a telegram from the Western Association agreeing to 10 words a minute in that amendment and not 12. That means 50 letters a minute, and we will agree to 50 letters a minute. We think that is plenty strong enough. We do not want these people to be experts. The old law requires 25 letters a minute, but we are willing to make it 50.

It is further provided in this amendment that the amateurs are limited to one-quarter kilowatt within 5 miles of any governmental receiving station. In the city of Indianapolis we have a receiving station on the post office building. That means all through Indianapolis we will be cut to one-quarter kilowatt, one-fourth of what we have had before.

That station has been operated all during the war and was in operation before the war, and, as I understand it, Mr. Burleson, the Postmaster General, intends to put a lot more receiving stations on post office buildings. We can not agree to accept an amendment which would cut us to one-quarter of a kilowatt within 5 miles of a Government receiving station unless the station is defined to come within the 100-mile limit.

Mr. HARDY. How far would one-quarter of a kilowatt enable you to communicate?

Mr. HAMILTON. Not very far under average conditions, but under ideal conditions one-quarter of a kilowatt will transmit 150 miles.

Mr. HARDY. Ordinarily would it transmit half that distance?

Mr. HAMILTON. No; it will not. I think it was brought out this morning that on 200 meters 1 kilowatt of power would not be practical between here and Baltimore.

Mr. HARDY. How large a kilowatt power would possibly result in interference with the smaller receiving stations licensed by the Government?

Mr. HAMILTON. There is no reason why they should receive on the amateur wave lengths at all. If they will stay away from the amateur wave length 1 kilowatt will not interfere.

Mr. HARDY. What wave length will the Indianapolis post office station operate on?

Mr. HAMILTON. That I can not say. They would not let me in the station, not being a Navy man.

Mr. EDMONDS. This 150 to 200 is reserved for the amateurs?

Mr. HAMILTON. It is.

Mr. EDMONDS. If you use 1 kilowatt you will not interfere with anybody, even if you used it within 100 miles of the Atlantic and Pacific Oceans?

Mr. HAMILTON. We would not interfere if we used it within 100 miles of either the Atlantic or the Pacific.

Mr. EDMONDS. Because that is the reserved length?

Mr. HAMILTON. Because that is the reserved length. I do not see why they should not give us a place and let us stay there.

Mr. HUMPHREYS. Is interference affected by the kilowatt power?

Mr. HAMILTON. Not necessarily; no, sir. It is a function of the wave length.

Mr. HUMPHREYS. You said not necessarily?

Mr. HAMILTON. Under the 1912 law if you have a pure wave you are required to have a pure wave, and if you obey the law strictly and fully it will not interfere.

Mr. HUMPHREYS. Whether you use a quarter, a half, or 1 would make no difference as far as the interference was concerned?

Mr. HAMILTON. No.

Mr. LEHLBACH. This amendment, as drawn, would prevent any wireless station in Washington from using a quarter of a kilowatt, because it would be within 5 miles of Arlington?

Mr. HAMILTON. Yes.

Mr. HUMPHREYS. How much are you limited to now?

Mr. HAMILTON. One kilowatt of power all over the United States.

Mr. HUMPHREYS. And the limitation applies only to stations within 5 miles of a Government receiving station?

Mr. HAMILTON. Yes. And we were limited then to half a kilowatt, and this proposes to limit us to a quarter.

Mr. HUMPHREYS. Can you tell me why that limitation is put on, if it does not interfere?

Mr. HAMILTON. I do not believe the Navy Department meant that to be that way.

Mr. HUMPHREYS. The present law puts a different limit where the station is operated within 5 miles of a Government station.

Mr. HAMILTON. They put it at half of a kilowatt.

Mr. HUMPHREYS. If it would make no difference, why did they put it in the present law?

Mr. HAMILTON. That law was made several years ago, and at that time the amateur's apparatus was very crude and not at all pure. The waves were not pure, but to-day we have a different condition. The amateurs have some of the finest stations there are, and there is no reason for that under present conditions. As we develop the art further there will not be any reason why we should interfere with any Government business, if we do not use over 1 kilowatt of power.

Mr. HUMPHREYS. How far can an amateur communicate with a quarter of a kilowatt? All over the city of Indianapolis?

Mr. HAMILTON. Yes; all over the city of Indianapolis.

Mr. HUMPHREYS. How far do you want to go?

Mr. HAMILTON. We do not want to put ourselves—we do not have much intercity communication. When we communicate a message like that Mr. Maxim spoke about going from New York to San Francisco in two hours, that is the kind of communication the amateur is interested in as pioneer communication. That is the highest standard, and when an amateur can do that he considers himself a pretty good amateur. They do not know how to handle the traffic. When they are talking back and forth in a town they are just beginning to learn, and after they have learned they can communicate between cities. Our closest station to Indianapolis that amounted to anything was 150 miles away.

Mr. HUMPHREYS. If the Post Office Department does extend their service and puts a receiving station on the post-office buildings in all the cities of any size, that will practically limit the amateurs to a quarter of a kilowatt?

Mr. HAMILTON. Yes; in places; and I gave that example because there is a station there now. I say that is a possibility, and when it is law and they say we can do this, when they have the authority to say that, they are liable to go ahead and do it. That is one reason I made that objection.

Mr. HARDY. About what would that station at Indianapolis cost the Government?

Mr. HAMILTON. If it is only a receiving station, it should not cost them over \$150 or \$200.

Mr. EDMONDS. If the Navy handles this the same as they do patents, they would not have one quarter of a kilowatt.

Mr. HAMILTON. I would like to ask for some information on section 3, and ask why it is not possible to cut out section 3, if the Navy takes over the stations—the experimental, technical, and training-school station? If they take over everything, why is it necessary to put in the bill, in section 3, on page 2, that “no person shall maintain or operate, on land or on a permanently moored vessel (first) within any State any radio station capable of being used (a) for the transmission of signals, the effect of which extends beyond the jurisdiction of such State or causes interference with the transmission or receipt of signals to or from any place beyond the jurisdiction of such State”? The only station there will be the Government stations and these stations provided for in the amendment. Why is that necessary? I could not see why it is necessary.

Mr. HARDY. Is it not plain that if the Government is going to take all your stations along with what now exists and prevent others from being put up, that they must do that; otherwise they would have to buy them as fast as they were put. That is the plain purpose of that.

Mr. HAMILTON. What is to prevent anybody doing that? It says for the receiving of signals to or from any place, signals which originate outside of the State. What would keep me from putting a wire in my back room and receiving messages? It is not my fault if the messages come in on the roof, and I do not see how the Government can keep me from receiving these messages.

Mr. HARDY. The proposition is to let the Government own the wireless stations. If a private individual should come along and put up more, the Government would not own them.

Mr. HAMILTON. I did not know that was the section that applied to that.

Mr. EDMONDS. It says—

This section shall not apply to experiment stations and technical training school stations duly licensed, as provided by the act to regulate radio communication approved August thirteenth, nineteen hundred and twelve.

Mr. HAMILTON. There will be only two kinds of stations.

Mr. EDMONDS. We could add amateur stations to that.

Mr. HAMILTON. I have here, Mr. Chairman, a communication from the Baltimore Radio Club, offered by Mr. Donald L. Primrose, who had to leave. Everything I have said they would agree to with only one exception, that they will accept the 12 word per minute in the amendment. They are at sea regarding the Government receiving stations—that is, limiting the amateurs to one-quarter of a kilowatt within 5 miles of a Government receiving station, and they wanted it to be on record that they are against that part of the amendment, as the representative of the Baltimore Radio Club could not appear this afternoon.

Mr. HUMPHREYS. What would you think of the proposition to create a commission with power to determine the wave length and the kilowatts that could be used by amateurs?

Mr. HAMILTON. As far as I am concerned, I do not see how it would be possible to have the amateurs represented on that commission. The present law is satisfactory and sufficient. It might be that we could have a convention and elect somebody to represent the amateurs, and that commission would be satisfactory to us, because we would have a representative on it.

Mr. GREENE. This commission was to be appointed by the President.

Mr. HAMILTON. If that is the case, amateurs would not have any representative on it whatever, I mean any elective representative.

Mr. HARDY. If you have your stations from which you can send ordinarily 75 miles with one-quarter of a kilowatt power, is not that sufficient for all the projected purposes of the amateur, to learn to send messages? Can he not learn everything in operating that kind of a station that he could in operating one that had one kilowatt power?

Mr. HAMILTON. I would say absolutely not, in the section I come from, because it is 150 miles from our town to the nearest station that we can talk to, that amounts to anything. There are no stations intervening that we could get through with on one-quarter of a kilowatt, and there are times when we can not get there with one kilowatt. All the amateur stations close in the summer time, because they have not enough power to get anywhere. We only operate in the wintertime. They start in November and run until April.

Mr. HARDY. So the 1 kilowatt would limit you to talking or carrying on communication with similar stations inside of Indianapolis?

Mr. HAMILTON. Yes; except in the wintertime under very ideal conditions.

Mr. HARDY. Then you might talk to a station in Ohio?

Mr. HAMILTON. Then we might talk to a station in Ohio. We have gone further than that in ideal conditions. We have very peculiar conditions in the Middle West. There are times when the naval station at Chicago can not reach Detroit. Those conditions they call freaks.

Mr. HARDY. The purpose of the amateur is to learn the art, to study the art, and possibly add inventions to the business.

Mr. HAMILTON. Yes; and then there is a certain pleasure to it, just the same as a man goes out and plays golf, so the amateurs operate their radio stations.

The CHAIRMAN. From that point of view you do not think their interests should be paramount to those of commercial interests of the country?

Mr. HAMILTON. No, sir; I do not.

Mr. WHITE. Will you not explain briefly just why, from your standpoint, it is desirable that we should have the right, for experimental purposes, to communicate, say, with this nearest station outside of Indianapolis?

Mr. HAMILTON. From my viewpoint, it is this, that the amateurs have been considerably in competition with each other, trying to see who could send the longest and to see who could get his station so efficient that he could get the farthest distance. When they do that, they learn to get such efficiency so that in operating their instruments most of their power goes into the ether and is not lost in the machine itself. When they do that they learn a wonderful amount of radio engineering, which they would not learn if they did not have a chance to communicate at some distance. If they do not have enough power to get across the State, there are not enough stations close enough for them to do anything. They would not know how far they were getting and would not know how efficient their stations were. They would not have any incentive to improve.

We now have a marked incentive to improve our stations. In the last two years there have been developments and inventions by the use of which our stations will be much more efficient and we will probably be able to do much better work and have not so much interference among ourselves. Under present conditions, when they get of age, we will say, and get into radio engineering they can do the same thing with large stations, and they will have the experience and the benefit of all this training in fixing up their stations to a state of high efficiency, and they can do the same thing them with the Government stations.

Mr. BURROUGHS. Do you happen to know whether there are many stations that would be situated similarly to Indianapolis?

Mr. HAMILTON. All through the Middle West—Denver, St. Louis, Kansas City, I believe. We have stations in those cities. In that Transcontinental Relay League they jump from Ohio to Chicago, down and cross to Kansas City, I believe, to Denver, and then to Los Angeles. Those stations are all through the Middle West, but not as thick as they are in the East.

Mr. GREENE. As I understand it, the amateurs are satisfied with the present law, which they had before the war. They have been *efficient in the war*, and now they want to go back to their former

position, and here comes a new law that ties them up so they can not get back to where they were. I can not see any reason, after they have rendered good service to the Government, why they should not have a chance to return to their former status.

Mr. HAMILTON. That is absolutely the condition. None of these amateurs would be here to-day if that bill had not been written so that it would cut them clear out. We came here to fight that part of the bill. The Navy Department has been good enough to help the amateurs out and help us get an amendment, but we would much rather have it the way it was.

Mr. GREENE. You are perfectly satisfied with the management of the business as it has been carried on?

Mr. HAMILTON. The Department of Commerce has treated us fine, and we have always gotten along well with the Department of Commerce. There is no reason why we should have a change that I can see.

Mr. BURROUGHS. Your attitude toward this amendment is not that you advocate it, but you take it as a protective measure in case the bill itself is to be enacted?

Mr. HAMILTON. That is the idea exactly.

Mr. GREENE. But you prefer to leave it as it is?

Mr. HAMILTON. Yes, sir.

The CHAIRMAN. Have you any objection to the existing law?

Mr. HAMILTON. No objection to the existing law; no, sir.

The CHAIRMAN. I supposed you had, from what you said.

Mr. HAMILTON. I thank you, gentlemen, very much.

STATEMENT OF MR. EDWARD C. ANDREWS, OF PHILADELPHIA, PA., PRESIDENT OF THE WIRELESS ASSOCIATION OF PENNSYLVANIA.

The CHAIRMAN. State your name, please.

Mr. ANDREWS. Edward C. Andrews.

The CHAIRMAN. Where is your home?

Mr. ANDREWS. Philadelphia.

The CHAIRMAN. What is your business?

Mr. ANDREWS. I represent here the Wireless Association of Pennsylvania as its president to-day.

The CHAIRMAN. What is your business?

Mr. ANDREWS. Shipbuilder.

The CHAIRMAN. In what yard?

Mr. ANDREWS. The Chester Shipbuilding Co.

My experience with the art of radio dates back to about 1909. I have had classes, private classes, of Boy Scouts and other little groups and for a while I instructed at Franklin Institute of Philadelphia.

I am here to-day to represent the Wireless Association of Pennsylvania, as its president, unalterably opposed to the change in the present law. We see absolutely no reason for it and lots of reasons against it. The one paramount reason in my mind against the enactment of this law is its sponsors. Understand, gentlemen, that what I may say is of a general character, and I do not want anybody to take what I say personally. I may, without thought, call a spade

a spade, whether it is an ace or a ten spot; but please pull your feet in if I happen to step on your toes. I will try not to. [Laughter.]

This bill eliminates the amateur entirely. It makes no provision and provides no scope for his development, and it simply tends toward that Government ownership which, I am sure, nobody has shown any good reason for having. It removes the incentive for experimenters or for any amateur to experiment. While it provides for technical or training-school stations or experiment stations, I fear it has taken away the incentive.

To show more clearly what I mean—this possibly may have been expressed before—the incentive is taken away because, as we understand, there are to be no other stations operated except by the Navy Department, and consequently all experimenters or technical and training-school scholars would naturally have to come under the head of the Navy Department; or, rather, they would have to enlist in the Navy in order to carry on the studies they have undertaken, and unless they were willing beforehand to enter the service there certainly would be no scholars for the schools, and that naturally would eliminate them. If we have no incentive and no place for anyone to go to sell apparatus, naturally that puts an end to experimentation. There is nobody to sell to, except the Navy Department or the Government, and we have learned from previous speakers that they do not buy. Consequently it eliminates experimenting and it deters people from taking up the art. Consequently interest in the art will gradually die out.

I want to speak a little on the wave-length question. As we understand, there was some little discussion a while ago regarding 200 meters and 600 meters. As you know, all amateurs were restricted to 200 meters. They did give us by the enactment of the London convention a wave length of 300 meters and 600 meters for ship work, but 300 meters is very rarely used, and it has been eliminated. Why it has been eliminated I can not say, and while I do not recall having heard of anybody doing any work on that wave length, the amateur is still held to a limit of 200 meters. Then comes the 600-meters limit, but the space between these two figures is vacant.

A gentleman this morning spoke about inland commercial work, as to why they could not work on 600 meters and travel a certain distance, say from Washington to Baltimore. Well, they could go even farther than that. There is no reason why they can not work up on 1,600 meters. The Wanamaker station in Philadelphia, that operates between Philadelphia and New York, operates on, I believe, 1,600 or 1,800 meters, and there is no other ship work or naval station work on that wave length, the navy yards working on about 1,000 meters, the ships working on 600 meters, and the amateurs on 200 meters.

If the ship-to-shore work is carried on on 600 meters, sharply tuned, as the law requires it shall be, there ought to be no interference from the amateur, and if the commercial station is working on 1,600 or 1,800 meters there is absolutely no danger of interference on that score; and if they are working on the higher wave length with the power they usually use, something around five kilowatts for the commercial stations, then they could carry on all this commercial work. I can see no reason why there should be any interference.

That is all I have to say, gentlemen.

**STATEMENT OF GORDON M. CHRISTINE, M. D., 2043 NORTH
TWELFTH STREET, PHILADELPHIA, PA.**

Dr. CHRISTINE. Mr. Chairman and members of the committee, I have but a very few things to say, because I think Mr. Maxim went over the ground very fully, and I think you understand from him that the act of August 13, 1912, was eminently satisfactory to the amateur.

My interest in the wireless question came from the fact that my son, who now is a commanding officer of the photographic department of the Air Service in France, bought for 10 cents a little detector with which the advertisement said he could hear the signals from Arlington. He rigged that up in my third-story end room and asked me to listen, using a house phone. Well, we listened and we thought we heard, but we did not. It required then a wire. He purchased a wire, but still we received no signals. He then purchased another wire and put it between two poles, using the house phone. We thought then we heard signals, but we did not.

We then constructed a better aerial and procured a set of head phones, and then we thought we could hear the signals, but we could not. He then purchased, for a couple of dollars, a transformer, and then we heard the signals of the Arlington station at five minutes of 10, giving the time. We then listened for the broad signal indicating the exact second of 10 o'clock. We had then a wireless receiving outfit at an expense of two or three or four dollars.

My interest in that became very great, because I was scout master of a troop of Boy Scouts, and it was my duty to teach them semaphore, and, inasmuch as in the manual there was a provision for teaching wireless telegraphy, it was necessary for me to learn wireless telegraphy.

I became extremely interested, and I have now in my house an outfit worth \$600 or \$700, which has been held in abeyance ever since the order of the President went forth that we were to lower our aeriels, and that outfit has not been used. I wrote some time ago to the Secretary of the Navy to ask him when we would be able to use our outfits, and the Assistant Secretary, Mr. Roosevelt, replied, "When the war was over."

Recently, hearing many of the boys say that now that the armistice was signed, they would probably be permitted to use their wireless. I wrote again to the proper department, and received the reply that until the proclamation went forth we would be obliged to keep our aeriels and our outfits quiet.

Now, I am greatly interested in medicine and surgery; that is my profession; but I am an amateur in wireless telegraphy and have become intensely interested in it. I am a member of the board of directors of the Wireless Association of Pennsylvania, and when we sent nearly every boy we had to the Navy and to the Army to do the work of the Nation in that direction we were limited in our membership to four, five, or six. I left my work and business every night we had a meeting of the board of directors or a meeting of the association and went there in an endeavor to keep up the work of the association, so that when the war was over we would be able to say to those boys that we had kept the association alive. My hair is gray and I am 61 years of age, but I am extremely interested in

this art. I love my profession, my work, but I came here this morning and am speaking to you now in behalf of the act of August 13, 1912, to ask you with all my heart and soul that you do not disturb that so far as the interests of the radio amateur are concerned.

You have sent the boys, you have allowed them to go, and they are there doing their service. Some of them have gone to the depths of the ocean in that service. I could read you most pathetic things from the wireless journals showing you what wonderful service those boys have rendered, and I have it from those in authority that the amateur did the very best work.

Now, why, while this war is going on and most of the amateurs are away in the Army and in the Navy, this thing should be done, I can not understand. We are willing that the work should go on as it was, with our half a kilowatt, a certain distance from a naval station—5 miles.

It so happens that my friend, Mr. Andrews, can only use a quarter-kilowatt transformer. I am just outside the limit of 5 miles, and I can use 1 kilowatt, but with an aerial of 200 meters I can not put all the strength of that 1-kilowatt transformer into the aerial because of a lack of capacity. Therefore, I am obliged, when I go to work again—and I hope you will allow me to do so—to reduce my 1 kilowatt to three-quarters of a kilowatt. I can not understand why it has been reduced in this amendment to a quarter of a kilowatt within 5 miles of a naval station and half a kilowatt outside that limit.

I know two boys who, as the result of my teaching, passed the examination at the Navy Yard. At the time I gave up the Scout work I had other boys, and they are ready to pass the examinations. I went down among the boys, around a table like this, and I was examined. As the result of my studies I received an average of 100, of which I am quite proud.

I have endeavored to teach the boys that one of the grandest things they can do in their study of electricity is to study wireless. It requires knowledge in many lines. I have in my cellar a lathe, and I have worked that lathe an hour at a time when my wife said that it was time to come to bed, and with that lathe I have made a wireless apparatus myself, and my friends about me, who are interested in this matter, know how difficult it is with a lathe to make a variometer. An amateur is some one who is in love with his art; when he goes beyond that and earns his living in sending and receiving signals, then he is a professional. I am as pure an amateur as you can get, and we have thousands of them throughout the country.

Now, we can not interfere with the Navy Yard. A wave length means something, say, that long [indicating], and a wave that long does not go beyond a certain width. If we send out our pulsations, thousands and thousands of them, in a column something like that width, and if the Navy Yard is adjusted to receive a wave length that long [indicating], how in the world can it hear the wave length we send out? Simply because they disobey the law, or that I am myself abusing my privilege and going above my limit.

The Wireless Association of Pennsylvania knew of a young man in the city of Philadelphia who is a genius. He is such a genius that he does not know there is such a thing as law, and he sent out his pulsations in all sorts of waves. He does not recognize the law; *he is too much of a genius*. A member of our association, who is

present here to-day, incurred his everlasting enmity because he reported him to the Wireless Association and the Wireless Association said "You must stop it." We are ready to report to the Government and to the proper officials any boy, any man, or any amateur who disobeys the law.

Now, we do not like this amendment; we do not want any amendment at all—

Mr. HUMPHREYS (interposing). Will you permit me to ask a question?

Dr. CHRISTINE. Yes, sir.

Mr. HUMPHREYS. If you can explain it to me, how could you tell it was this particular genius who was violating the law?

Dr. CHRISTINE. There always is a call letter. My call letter is 3-L-O. Every wireless expert or amateur in the city of Philadelphia knows when this particular genius sends out his calls or his signals—just as you would recognize me by seeing my handwriting or looking at my face. When Mr. James uses his apparatus, I know it is Mr. James. When Mr. Serviss uses his, I know it is his. In addition to his call letter, there is a certain tone, either sharp, rough, or otherwise. Then, the distance, and the experience we have in hearing these signals, determine these points. And it was proven in that and other ways that this young man was infringing the law. Therefore, the wireless association regarded it as its duty to see that the law was obeyed, and reported him.

Mr. HUMPHREYS. You can recognize a man's sending—an individual's?

Dr. CHRISTINE. Yes, sir; we can recognize his sending and his work. I can tell you absolutely whether I am listening to the navy yard or to Arlington, and I want to say I was always pleased to hear Arlington, but the navy yard operators were pretty miserable.

Mr. HUMPHREYS. Well, they were all amateurs, as I understand it?

Dr. CHRISTINE. I doubt it.

Mr. HUMPHREYS. Their testimony has all been to that effect, practically.

Dr. CHRISTINE. Now, give us this old law. Do not disturb that. We have been very content, Mr. Chairman and members of the committee, with the treatment we have received from the Department of Commerce and Labor. We are developing a number of boys in the art of wireless telegraphy, and it is from that host of boys that the commercial stations and the Army and the Navy must receive their material. It is a world-wide university, and the boys have availed themselves of it, and that is why the amateurs are here to-day asking that we do not disturb the law of 1912.

Mr. BESHILIN. Where, in your opinion, would there be any difference in the control of this by the Department of Commerce and by the Navy Department?

Dr. CHRISTINE. I think the general opinion is—

Mr. BESHILIN. I want your opinion, not the general opinion.

Dr. CHRISTINE. My own opinion is that the treatment which the Department of Commerce and Labor has given us has been that of man to man and the treatment which the Navy would give us would be the treatment of a high official to a civilian.

Mr. BESHILIN. That is just an impression?

Dr. CHRISTINE. That is my impression; yes, sir.

Mr. BESH LIN. Not born of any experience?

Dr. CHRISTINE. Then, it is the province of the Department of Commerce and Labor to engage in business. Is the Navy going to enter the business of communicating messages here, there, and elsewhere? If so, why do they not take up the telegraph and telephone, and the post-office work? Why should they take up this particular work. They are, of course, in a warlike attitude; they are in military life; but why should they take over the commercial work? In other words, if the Navy takes this over, what is to interfere with their controlling the use of the wireless in the mines between the bottom of a mine and the top of a mine? What is to interfere with their controlling the use of the wireless in the railroad, as between train and train or between train and stations? Will the Navy Department take that up also?

Now, when the navy yard hears the amateur who is operating within the law he is simply disobeying the law himself—

Mr. BESH LIN (interposing). Does it not necessarily follow that the Navy must have a certain control of this in order to regulate the ships at sea?

Dr. CHRISTINE. No; their regulation of ships at sea has not anything to do with the matter whatever. You can make the law more stringent, if you will, regarding the amateur, so far as I am concerned. I knew a boy not far from me who, after the war was declared, thought he was doing all right to receive, and I said to him, "If you do that I shall report you." And if this law is allowed to remain as it is I can assert positively that no matter how stringent you make the law the Wireless Association of Pennsylvania will see to it that it is obeyed. And I believe there are very few of our amateurs who have disobeyed the law. You know as well as I do that there are some who will disobey any law.

Mr. HARDY. Have you any objection to the receiving stations being required to take out a license?

Dr. CHRISTINE. I would favor having the receiving stations licensed.

Mr. HARDY. Do you know that the law of 1912 does not require any license?

Dr. CHRISTINE. I know it does not, and I think that was one of its weak points. There ought to be a law to amend that.

Mr. HARDY. Over and above that, except as to the provision limiting them within 5 miles of a station to a quarter of a kilowatt power, do you see anything in this amended provision that substantially interferes with the existence and progress of amateur radio telegraphy?

Dr. CHRISTINE. No; if you limit it to a half kilowatt and a quarter kilowatt, the amateur will go on. It will probably be, in a sense, more of an incentive.

Mr. HARDY. You heard the first gentleman who spoke in behalf of the amateurs?

Dr. CHRISTINE. Yes, sir.

Mr. HARDY. It seemed as if most of the amateurs had really agreed on these terms. Have you really any serious objection to that amendment?

Dr. CHRISTINE. I have no serious objection to that amendment, except that, inasmuch as they are limited to one kilowatt far away and one-half a kilowatt within 5 miles of a naval station, I can not

see that that will in any way interfere with the ships or naval stations. I can not understand why the amendment pulls it down.

Mr. HARDY. That is really the only objection you have?

Dr. CHRISTINE. That is the only objection I have; yes, sir.

Mr. HARDY. Otherwise the amendment is all right, you think?

Dr. CHRISTINE. Except that in the latter part there I would like to change the term "Government receiving station." I would favor having that changed to read "Government military or naval station." It may make no difference, but "Government receiving station" is rather indefinite. We all understood that under the old act as being a navy yard or a station of larger sort.

Mr. HUMPHREYS. Have you a copy of the law there? What is that language?

Dr. CHRISTINE. Regulation 15 provides [reading]:

No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding 200 meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce contained in the license of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of \$100 or \$25, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

Lieut. Cadmus, when satisfied that the amateur was disobeying the law, would come to his station, or have some one go there, and have that station tuned. And when it was once tuned it was the duty, of course, of the amateur to keep it so tuned, and it was likewise the duty of other amateurs to notify the Government if that law was in any way violated.

Mr. HUMPHREYS. How is the inspector, whoever he is, to find out that the amateur is violating the law if he is forbidden to tune his instrument so as to answer that particular wave?

Dr. CHRISTINE. If he is forbidden?

Mr. HUMPHREYS. I understood you to say they violated the law by listening to what the amateur would say, because they have no right to get down into that 200-meter limit.

Dr. CHRISTINE. No; the Navy violates the rule by detuning his own apparatus so he will receive on 200-meter wave lengths.

Mr. HUMPHREYS. But I understood you to say the Navy Department—

Dr. CHRISTINE. The Navy Department can only hear the amateur at 200 meters by lowering his own tone; in other words, by disturbing his tuning.

Mr. HUMPHREYS. Well, some Government official would have to have that right or else they would never catch it, unless they would leave it to the amateurs to catch each other.

Dr. CHRISTINE. The point is, sir, that the amateur, if he is obeying the law, is not disturbing that naval station, and if he is disturbing that naval station the naval station is disobeying the law itself in coming down below its 300 or 600 meters.

Mr. HUMPHREYS. But should not somebody in the Government be permitted to listen and hear what he is doing?

Dr. CHRISTINE. Yes, sir; I agree with you. I say to you that we wish this law—I say “we,” but the amateurs, so far as I know, have had no gathering together. They have come here to-day to listen, each man to speak for himself and for the men whom we particularly represent. But I think we nearly all agree that this is the best proposition, and we are perfectly willing that you should put a very stringent provision in the law as regards the amateur and see to it that he obeys those injunctions.

Mr. HUMPHREYS. You object to the Navy having to ascertain that the amateurs were doing things that they ought not to have done and ascertain that by tuning their instruments down to 200 meters. That was during the war—

Dr. CHRISTINE. Oh, no; we have now no complaints. No amateur has been using his apparatus during the war.

Mr. HUMPHREYS. When was it that the Navy did this?

Dr. CHRISTINE. Prior to the war, when we had the right to use 200 and the navy yard was supposed to use 600 and 300; they could not hear our 200 unless they lowered their own tuning. Many a time there have been amateurs in the city of Philadelphia who have notified the navy yard that ships were sending to them when they could not hear them; many a time that has happened, and I think there is a witness here to-day who can prove it.

Mr. HUMPHREYS. Give us the language, please, that you were about to point out. You said you did not approve of the term “Government receiving stations.”

Dr. CHRISTINE. An officer might have simply a receiving station, and then he would come under that classification. I do not like this expression “Government receiving station.”

Mr. HUMPHREYS. You would rather have it “naval or military”?

Dr. CHRISTINE. Yes, sir; that would be my suggestion. In other words, a bona fide station and not of some officer who may have a receiving station or in any way a governmental station only for receiving purposes. In New York City there is a police wireless. I have not heard that the police find that the amateurs interfere with them in any way. And I suppose that in the city of Philadelphia and everywhere wireless will become a very common means for communication.

Mr. HUMPHREYS. You think it is proper, then, to limit the amateurs within 5 miles of a military or naval station to one-half kilowatt?

Dr. CHRISTINE. Yes.

Mr. HUMPHREYS. Then there is evidently some good reason for that; I imagine interference. If that be true, why should not that apply if the Government has a receiving station other than military or naval?

Dr. CHRISTINE. I believe that is simply an arbitrary statement. I can not see that there would be much difference between a kilowatt, if properly operated, and half a kilowatt.

Mr. HUMPHREYS. Yes; I understood you to agree that you thought that was a reasonable regulation.

Dr. CHRISTINE. It is a reasonable regulation.

Mr. HUMPHREYS. But if it is reasonable for military or naval stations, why is it not reasonable for any other Government receiving stations?

Dr. CHRISTINE. Then that would exclude the amateur all together.

Mr. HUMPHREYS. Did it exclude them altogether when you had it "naval and military?"

Dr. CHRISTINE. No, sir.

Mr. HUMPHREYS. They operated with one-half a kilowatt, although they were within 5 miles of a military or naval station?

Dr. CHRISTINE. Yes, sir.

Mr. HUMPHREYS. Why, then, would it exclude them altogether if you say "any Government receiving station?" Why can you not still operate? Suppose the receiving station is a post-office station. You can operate within 5 miles of a naval station or a military station; why is it you can not operate within 5 miles of a Government station?

Dr. CHRISTINE. The Government stations, as we understand them, would be large stations like the naval stations. The smaller stations would be scattered here, there, and elsewhere, and doubtless will be, and that would limit the amateur so much that he would have to keep down to his quarter kilowatt altogether.

Mr. HUMPHREYS. You may have some good reason for it, but I do not understand it myself. What is the reason you can operate all right within 5 miles of a military or naval station on your one-half kilowatt but you could not do it if it were some other sort of Government receiving station? Just what is the reason?

Dr. CHRISTINE. I do not catch your point.

Mr. HUMPHREYS. Here is your objection. This amendment provides the limit "within 5 miles of a Government receiving station." You want that changed to read "military or naval receiving station?"

Mr. LEHLBACH. Not "receiving"; "military or naval station."

Dr. CHRISTINE. It should be a bona fide station.

Mr. HUMPHREYS. You want to strike out the words "Government receiving" and insert in their place "military or naval?"

Dr. CHRISTINE. Yes, sir; that it shall be a bona fide station.

Mr. HUMPHREYS. Well, now, why? Why do you want that?

Dr. CHRISTINE. Because there would probably be only one bona fide military or naval station within a district. I suppose the military and naval departments are divided up into districts, whereas there might be a receiving station at every residence of a military or naval officer.

Mr. HUMPHREYS. If it does not interfere with you, what difference does it make?

Dr. CHRISTINE. It does not interfere with us in any way.

The CHAIRMAN. As I understand, Mr. Humphreys, the number of military or naval stations is now limited; hence that provision of the law limiting the use of one-quarter kilowatt by the amateurs is negligible. There are so few of those stations.

Dr. CHRISTINE. Yes, sir; we are willing to submit to that.

The CHAIRMAN. But if these stations were increased in number all over the country—here, there, and everywhere; if, as somebody has suggested, a naval officer had a receiving station in his residence that should be considered a Government station, it might limit the amateurs to the use of a quarter kilowatt if the thing should be multiplied to that extent.

Mr. HUMPHREYS. But I gathered from what he said that it did not interfere with the amateurs operating within this 5-mile limit.

Mr. ROWE. That is, on one-half kilowatt.

Dr. CHRISTINE. It does not interfere with us at all, sir. The question is, will our use of one-half kilowatt interfere with the Government under any circumstances? But there is the law, and we are willing to have it just as it is here.

Mr. EDMONDS. In other words, it is your opinion that this restriction of stations under the 1912 law could be stricken out altogether?

Dr. CHRISTINE. Yes, sir.

Mr. HUMPHREYS. You object to the words "Government receiving stations" and you want those stricken out and to insert in place of them, "naval or military station"?

Dr. CHRISTINE. Yes, sir.

Mr. HUMPHREYS. Can your one-half kilowatt or one-quarter kilowatt interfere with the sending of a message as well as receiving it?

Dr. CHRISTINE. No, sir.

Mr. HUMPHREYS. Then what difference does it make if it be a Government receiving station?

Dr. CHRISTINE. Under the present law, sir, I have a 1-kilowatt transformer in my wireless room which, if the President says I can, I shall try to operate, but the chances are I shall have to have it rearranged and turned into a three-quarter kilowatt transformer. I may disagree with my brothers here, but I doubt whether I can get the power from a 1-kilowatt transformer into a 200-meter wave length aerial. It has not the capacity. Therefore, I will reduce it to three-quarters.

I am now outside of the 5 nautical miles limit from the navy yard, but there is a receiving station at Chestnut Street. I am within 5 miles of that. I believe that under this law I would be regarded as having the liberty to use 1 kilowatt, because I am 5 miles away from a naval station. I call the naval yard a "naval station," but I do not call that receiving station at Chestnut and Twelfth Street a naval or military station. That is to say, I believe the intent in framing that law was that that should be a power station for transmitting and receiving.

Mr. HUMPHREYS. Personally, I am very anxious to protect the rights of the amateurs, and I thought maybe there was some good reason that you had for wanting to substitute "military and naval" for the words "Government receiving." I wanted to get that clear in my mind.

Dr. CHRISTINE. At Twelfth and Chestnut Street there is a receiving station. The navy yard is 5 miles away from me. Now, if this provision is applied to that receiving station, I can not use my 1 kilowatt or three-quarters kilowatt, but will have to get a quarter kilowatt transformer. The Chestnut Street station is only 3 miles from me.

Mr. HUMPHREYS. Suppose we make it a half instead of a quarter, just as it is now. What difference does it make to you whether it is a Government receiving station or a naval or military station?

Mr. LEHLBACH. Mr. Humphreys, don't you see it impairs the efficiency of his plant by reducing it from a 1 kilowatt to a one-half kilowatt power?

Dr. CHRISTINE. I was getting my apparatus so tuned that I believe in a short while I would have been able to do as good work as any other amateur in the city of Philadelphia.

Mr. HUMPHREYS. It will not impair the usefulness of your plant at all, unless that interferes with some Government receiving station. If it does interfere with Government work——

Mr. LEHLBACH (interposing). The law says that if he is within 5 miles of a Government receiving station, whether he interferes or not, he is restricted.

Mr. HUMPHREYS. Well, there must be some reason.

Mr. LEHLBACH. His argument is that there is no reason for the restriction.

Dr. CHRISTINE. I do not want the Navy to put a station within a square from me, and then say I can not use my present apparatus.

Mr. HUMPHREYS. I should not want to accuse the Navy of doing that——

Dr. CHRISTINE. I am not accusing the Navy.

Mr. HUMPHREYS. But the Navy ought to have authority to put plants wherever they want to.

Mr. HARDY. I understand you to say that if it was a naval station you would not mind that provision prohibiting you from being the possessor of such a plant within 5 miles of it. Now, if there is no trouble about your obeying that law within 5 miles of a naval station, what trouble in the world is there about your doing it within 5 miles of a receiving station?

Dr. CHRISTINE. None whatever. I think it is foolish to have the difference between a half kilowatt and a kilowatt.

Mr. HARDY. The whole of Washington practically is within 5 miles of a naval station, and all Washington is subject to this limitation of a quarter kilowatt. When you get outside of it you have privileges that these people do not have here. All New York is in the same position. Now, you think it is no burden on New York and Washington to be subject to those limitations because they are near a naval station or Army station. If it is no burden on Washington and New York City to have these limitations, why would it be any more of a burden on you if you are out in the country?

Dr. CHRISTINE. Understand me; I thought I had made it clear. My own view is that it makes no difference to the navy yard whether we use a half a kilowatt or a kilowatt; it does not disturb them.

Mr. HARDY. But Mr. Humphreys is trying to ask for your reason why you object to the words "receiving station" and want it "naval station."

Dr. CHRISTINE. Because under the present law I can use a 1-kilowatt transformer, because I am outside of the 5-mile limit. But if I am within that limit I have to use the one-quarter kilowatt, which I consider absurd. It makes no difference to the navy yard in its transmission or receiving whether we use the 1 kilowatt or one-quarter kilowatt. If I were to amend this, I would make it three-quarters of a kilowatt square.

Mr. HARDY. Then you were satisfied with the old law simply because it did not interfere with you?

Dr. CHRISTINE. No; because it did not interfere with the Navy or anything else.

Mr. HARDY. You do not get my point. It did interfere with everybody within 5 miles of a naval station, but it did not interfere with you.

Dr. CHRISTINE. No; if I were within 5 miles, I should follow the provisions of the law.

Mr. HARDY. But you are not?

Dr. CHRISTINE. If I were, I would use the provisions; I should avail myself of the provisions here for one-quarter kilowatt.

Mr. HUMPHREYS. Could you get along with that?

Dr. CHRISTINE. I would have to.

Mr. HUMPHREYS. But could you?

Dr. CHRISTINE. Yes.

Mr. HUMPHREYS. Then, if you could do it, why are you so frightened by the possibility of a Government receiving station, other than military or naval, being put within 5 miles of you?

Dr. CHRISTINE. I would make that a round figure. Instead of saying "one-half" or "one-quarter" I would say that the amateur should be permitted to use a quarter or a half, no matter where he is.

Mr. HUMPHREYS. You are speaking now of yourself as an individual?

Dr. CHRISTINE. No, sir; I am speaking for the amateurs.

Mr. HUMPHREYS. You are speaking for the amateur who lives right there where you do?

Dr. CHRISTINE. I am only using my own case as an illustration. I see no reason why that was originally put at a quarter kilowatt and a kilowatt. I can not see any reason for it, and I can not see any reason why in this amendment it should be limited to a quarter, or a half.

Mr. HUMPHREYS. Most of the amateurs who have talked to me seem to be more afraid of the naval and military authorities having something to do with this than they were of the civil branches of the Government. You seem to differ with them. You are not objecting to a military or naval station, but if it is going to be a civil station, a station of the Post Office Department, for example, you become alarmed.

Dr. CHRISTINE. May I put on record my belief? Of course others have told me, "Say nothing as to belief," but I have been on the witness stand as an expert many times, and I know just how I am permitted to testify, but I believe that the Navy has it in for the amateur and wants him out. He would not have presented that original bill if he did not. But they became somewhat alarmed at the tremendous uprising of the amateurs throughout this country at the prospect of being deprived of the use of their outfits. The other night we could hardly get into our room, the young men, amateurs and others who came, and I am quite sure when the amateurs of the country hear of this there will be a tremendous protest.

Mr. HARDY. Your belief that the Navy has got something against the amateur is simply from the language of the original bill?

Dr. CHRISTINE. Yes, sir.

Mr. HARDY. Did you ever see any bill as originally framed that did not require corrections to be made in it?

Dr. CHRISTINE. I know, but this is not a correction, it is an alteration.

Mr. HARDY. Did you talk with any of the naval authorities, to see whether they were friendly toward you or had enmity toward you?

Dr. CHRISTINE. No, sir.

Mr. HARDY. Or whether they were personally willing to correct any error?

Dr. CHRISTINE. I should not know what authority to go to.

Mr. HARDY. Have not the amateurs here conferred freely with the naval representatives presenting this bill?

Dr. CHRISTINE. I came here this morning, sir, and do not know.

Mr. HARDY. You have talked with your brother amateurs. Have you seen any disposition to be unjust to the amateurs by any naval representative before this committee?

Dr. CHRISTINE. No, sir.

Mr. HARDY. So far as you have heard, has there been any unfriendly action or expression on their part?

Dr. CHRISTINE. No; I simply saw the original bill.

Mr. HARDY. You are only judging from the original bill?

Dr. CHRISTINE. From the original bill. Now, I say, they have amended that original bill by presenting an amendment which in many respects is satisfactory.

Mr. HARDY. I have not heard the naval authorities say, but I do not think the language of the bill as presented included amateurs. I do know that when representatives of the amateurs and the department got together there seemed to be a great deal of harmony and friendly disposition between them, from every expression that I have heard here.

Dr. CHRISTINE. I am very glad to learn of that, sir.

Mr. HARDY. Now, another thing. You spoke, Doctor, of wanting to have this put in the Department of Commerce and Labor. It so happens that there are two departments; Commerce is one and Labor is the other. Which one do you want it in—the Department of Commerce or the Department of Labor?

Dr. CHRISTINE. The Department of Commerce.

Mr. GREENE. When the department was created it was made the Department of Commerce and Labor, and the two branches were separated afterwards. That is how he may have been confused, because that was the original name of the department.

Mr. HARDY. I was asking the doctor if he cared which one it was, whether it was the Department of Labor or the Department of Commerce.

The CHAIRMAN. I suppose he refers now to the department that has jurisdiction of radio matters, which after the division of the Department of Commerce and Labor continued to be the Department of Commerce.

Dr. CHRISTINE. Yes, sir.

Mr. EDMONDS. Doctor, this act of 1912 has been enforced by the Department of Commerce and it has been very satisfactory to the amateur operators?

Dr. CHRISTINE. Eminently so.

Mr. EDMONDS. And they have been treating you very nicely?

Dr. CHRISTINE. Very well indeed.

Mr. EDMONDS. Now, the power of licensing amateur stations is in the hands entirely of the head of that department?

Dr. CHRISTINE. Yes, sir.

Mr. EDMONDS. He can give a license or not, just as he chooses?

Dr. CHRISTINE. You mean under the former method?

Mr. EDMONDS. Yes.

Dr. CHRISTINE. The process was simply this: I made application to Lieut. Cadmuss, or the Department of Commerce, and was furnished with blanks. Then I went to the Navy Yard and was examined. That examination was averaged, and then I was notified that if I took the oath I could get my license.

Mr. EDMONDS. Still, they had the privilege of refusing you a license if they wanted to? They were not forced under the act to give you a license?

Dr. CHRISTINE. Oh, yes; I believe they could reject my application. I am not positive of that.

Mr. EDMONDS. Under the law, that is right.

Dr. CHRISTINE. Yes; I believe they could. They may not have liked my personality or may not have liked something else.

Mr. EDMONDS. Under this new bill is it possible the Navy Department would have that same privilege?

Dr. CHRISTINE. Yes, sir.

Mr. EDMONDS. And they could give out 10 licenses or thousands of them, just as they chose?

Dr. CHRISTINE. Yes; and I see no provision there for an examination.

Mr. EDMONDS. And they need not give a license to an amateur. When you turn this over to the Navy Department that same condition exists, and if the Navy Department does not want amateurs in a certain district they can simply refuse them licenses. Now, the Department of Commerce is a business department, and it is used to handling business, and in its report it speaks very highly of the amateur operators. Undoubtedly they have got along very well together, and I do not blame the amateur operators for coming here and objecting to a change in the departments. If I were they, I would do the same thing myself, because they know what they can get from the Department of Commerce, and do not know what they can get from the Navy Department.

Mr. HUMPHREYS. It occurs to me that the law should be such that no department could arbitrarily refuse to give a man a license if he comes within the requirements of the statute. He ought to have a right to go into court and force them to give a license unless they show a good reason why they should not.

STATEMENT OF MR. JOSEPH HEINRICH, 514 B STREET SE., WASHINGTON, D. C.

Mr. HEINRICH. Mr. Chairman and gentlemen of the committee, I am only a youngster, as you express it—

The CHAIRMAN (interposing). How old are you, son?

Mr. HEINRICH. Thirteen. (Continuing) but I would like to voice the thoughts of an amateur at the proposition of so unjust a law. The man who proposed such a law could not, I am sure, have known the feelings of an amateur. As for myself, I am only a boy who got the "wireless bug" long before the war came to a happy termination, planning, as I was, to have a set of my own and counting the *days until I could put up my aerial and go ahead*. And then to have

such a bolt come out of the clear blue! No words can express my feelings, and I am sure all the amateurs feel the same way.

May I ask why do they want to wipe out the amateurs in the United States of America—

The CHAIRMAN. My son, nobody had any such notion as that. If they put that into your head, they put a "bug" in there that has no place there. You go home and sleep soundly to-night and take it for granted that there is nobody in this committee that is unfriendly to the amateur.

Mr. ROWE. I would like to hear what the boy has to say.

Mr. HEINRICH. They are not a bunch of boys who break the laws. They can easily be tuned out when forbidden to use a long wave.

Now, let me ask who furnished the boys for Uncle Sam and the merchant marine? When the call was sent out for more operators, who answered? The amateurs; the ones who operated their little stations in a dim cellar or attic. They are the ones who came forth and offered themselves to Uncle Sam. They helped materially to bring this war to a quick and successful termination; and, now that it is over, won't you let them operate their little stations?

And where can Uncle Sam turn for operators in case of another war? To the amateurs; and if there were none, God only knows. Every American ship, every transport loaded with soldiers, and every battleship of any sort must have at the very least two operators.

And where do the present operators get their knowledge? The majority of them were formerly amateurs. I know a number of them personally, and they are the men that believe that amateurism should not and will not be stamped out as long as there is an amateur left to fight. We want our rights. This is a free country; and, furthermore, gentlemen, to show the absolute baselessness of the law, there can be any number of receiving stations operated at the same time without any possible interference.

Then, why does that man want to cut us out? What are his reasons for proposing a law to wipe out the amateurs in the United States of America? You have given us a standing which we do not enjoy in any other country, and now will you take it away from us? The Government had no trouble with us when the war began. They simply sent around the notice that all amateur stations should be closed for the period of the war and it was abided by.

Again, may I ask, what was his reason for proposing such a law? which I hope will be as completely defeated as the one before. We, the amateurs of the United States of America, know our rights, and we will fight until we get them. And now, gentlemen, we ask you to help us to see that this law is defeated.

I thank you, gentlemen, for your kind attention. [Applause.]

STATEMENT OF MR. CHARLES H. STEWART, CHAIRMAN LEGISLATIVE COMMITTEE, WIRELESS ASSOCIATION OF PENNSYLVANIA, ST. DAVIDS, PA.

Mr. STEWART. Mr. Chairman, I have appeared before this committee on previous occasions in connection with this legislation, or legislation of a similar nature, and I have very little to say to-day. I think most of the members of the committee are familiar with what I had to say before.

All I have to say is that we favor, in times of peace, the control of radio communication being left entirely in the hands of the Department of Commerce. As that has been stated very clearly by a number of other witnesses who have preceded me, there is no use in my amplifying on that to any extent.

Mr. Maxim, in his statement to the committee this morning, very ably expressed, in my opinion, the views of a vast majority of amateurs.

There are one or two points which were not touched upon, however, so far as I heard the testimony to-day.

One is the question of the examination as to the speed of an operator. That is all regulated at present, under the act of 1912, by the regulations promulgated by the Department of Commerce under the act of 1912. So that no further legislation is actually required to change any minor points of that kind; they can all be covered under the existing law.

The second point which has not been brought out is that while a great deal of discussion has taken place in regard to interference by amateurs, I do not believe that there are any specific cases mentioned where, through such interference, if it did exist, any lives were lost; nor do I know of any specific cases where it did actually exist to any extent, so as to prevent the prompt sending of aid to a vessel.

That is about all I have to say. I do not want to take any more time of the committee; your time has been pretty well taken up already in this discussion.

The CHAIRMAN. The committee will now hear the next witness.

STATEMENT OF MR. HARRY W. DENSHAM, COLLINGSWOOD, N. J.

Mr. DENSHAM. I am secretary of the South Jersey Radio Association, an association whose members cover the district throughout the southern counties of the State of New Jersey.

Mr. Stewart and Mr. Maxim have taken quite a burden off my mind, and have relieved me of what I came to Washington to say; so that there is nothing I can say, other than that the members of our association have had very cordial relations with the Department of Commerce, and are perfectly satisfied for everything to go on as it has in the past. We have had no trouble anywhere in my district with either the Navy Department or the Department of Commerce.

There is really nothing else I can put in that would not be a repetition of what has been gone through heretofore in these hearings.

Mr. HARDY. Then you agree with Mr. Maxim, as I understand you?

Mr. DENSHAM. Yes; we have had no trouble, and there is no reason for dissatisfaction on our part.

Mr. HARDY. Are you one of those who conferred with the naval authorities in reference to that proposed amendment to the bill?

Mr. DENSHAM. No, sir; I have had nothing to do with anybody except those that I have been speaking to in this committee room.

Mr. EDMONDS. Do you mean you agree with Mr. Maxim's conclusion that it would be better to have it left in the Department of Commerce, just where it is now?

Mr. DENSHAM. Yes; in the Department of Commerce, just where it is now. We have had no trouble with anybody about it.

Mr. BURROUGHS. How do you feel toward the restrictive provisions of this measure?

Mr. DENSHAM. I am in a position where I have to keep to a half kilowatt—but that is a personal matter. If I was in a position where I would have to cut down from one kilowatt to one-half kilowatt, I would not be very well satisfied; I mean with the resulting necessity of having to throw away apparatus and buy new apparatus.

Mr. BURROUGHS. Just what would be the effect on the efficiency of your station in going down from one-half kilowatt to one-quarter kilowatt?

Mr. DENSHAM. It decreases the distance which I can transmit. One-quarter kilowatt, in the section of the country from which I come, is not good for more than 20 miles. Of course, on a clear, winter night, we have done better than that; but that would not be general by any means.

Mr. HARDY. Do you believe that these receiving stations ought to be licensed also?

Mr. DENSHAM. Only to show the strength of the amateurs, so far as I can see; so far as taking out a license for a receiving station, it is going to hurt a lot of jewelers who use it for getting their time signals. It would be a good thing for amateurs, simply because it would show the exact number of men in the field.

Mr. HARDY. Do you object to their being licensed?

Mr. DENSHAM. Positively no—provided there is no examination on the technical subjects.

Mr. HARDY. I do not understand that there is any technical examination for the issuance of a license.

Mr. DENSHAM. I do not know as to that.

Mr. HARDY. Well, I would like to know; that is a part of this proposed amendment, and I would like to know whether you oppose or favor the licensing of receiving stations. I am frank to say that I favor it; I think it would be a good thing for the amateur as well as for the Government.

Mr. ROWE. Would you be cut down under this proposed amendment to one-quarter of a kilowatt?

Mr. DENSHAM. Yes, sir; from a half kilowatt.

Mr. ROWE. And you are very much opposed to that?

Mr. DENSHAM. Well, naturally. We all want all we can get, although we do not want to cause any trouble or interference anywhere; we have not done so up-to-date, except in a few flagrant cases of violation of the rules that I have heard of.

Mr. BURROUGHS. From a scientific or technical point of view, do you see any reason for cutting it down?

Mr. DENSHAM. As Mr. Maxim said this morning—well, I might contradict him a little. There is absolutely no reason why a station operating on one-half kilowatt, as they are to-day, would interfere with any other station. In fact, we have had no trouble with commercial stations. We had trouble with the Philadelphia Navy Yard some years ago; but since then the apparatus has been perfected a good deal, and there is no trouble now.

Mr. BURROUGHS. What would you say the limit ought to be?

Mr. DENSHAM. Well, I am not much of a technical or scientific expert. I presume it could be figured out mathematically; but that is too deep for me.

The CHAIRMAN. Are there any further questions? If not, we will hear the next witness. This will be the last witness we will hear this afternoon, then we will adjourn until to-morrow; I hope that we will finish the hearings to-morrow.

STATEMENT OF MR. FRANK B. CHAMBERS, PHILADELPHIA, PA., REPRESENTING WIRELESS ASSOCIATION OF PENNSYLVANIA; MISSISSIPPI VALLEY WIRELESS ASSOCIATION; COLORADO WIRELESS ASSOCIATION; ST. MARTIN'S COLLEGE, LACEY, WASHINGTON; AND AMATEURS OF THIRTEENTH NAVAL DISTRICT, PUGET SOUND.

Mr. CHAMBERS. My name is Frank B. Chambers; residence, 2046 R Street, Philadelphia, Pa.

I am an electrical engineer, and also a radio engineer.

I have owned and maintained a radio laboratory, and I am deeply interested in the progress of the art. I come in contact with a lot of boys, because I make a lot of pieces of apparatus and parts of apparatus for boys. A lot of boys make their own apparatus as far as they can go, but they have not the machinery to make them all; sometimes there are little things that they can not make. I myself have no big machinery; most of my machinery is operated by hand, but it answers the purpose.

If one went into a large field of manufacturing, of course my machinery would not do it.

But I have watched the boys since 1905. I got taken up with this wireless proposition about that time, and I was doing pretty well in the commercial field as an electrical engineer, and I have had a very broad training. I have worked for telegraph, telephone, electric-light, and overhead street railway companies; and, of course, after my education on the electrical end of it I am better qualified to speak of it.

Of course, for a long while I had very humble positions; but my later years, before I got deeply interested in the wireless—I have held positions as foreman, superintendent, and wire chief. I happen to be assistant wire chief of one the largest telephone exchanges in Philadelphia. So that I can look at this thing from a very broad angle. Probably if I had not got interested in the wireless, but had stuck to the other end of it, I might have been worth a good deal of money to-day. But I have done a great deal of work and have not made much money; and if I did not have some other means of income, my wife might have to go out to work. However, we have managed for her not to do that, although, of course, if it was necessary she would do it. And I will tell you some of these men have been after information, and I find that they want an humble explanation; they do not want a deep, technical explanation; they want to be able to understand it. I can give you some little illustration to explain how the wireless situation looks to the amateur. This you can understand; anybody can. Take it out on the farm. A lot of you gentlemen were probably raised on the farm. I say I can *always tell a man who was*, even though he has a city polish on him;

it shines through. He is supposed to be a man that usually talks too loud and says too much; that is the way you can tell he was raised on a farm. The city fellow hides behind some place and whispers.

You know what a chicken is—a hen. You have seen him run around the barnyard. The hen roosts in trees at night—out on a limb.

And then you know the screech owl. A screech owl is a little bird, about this big [indicating]. He roosts on that same limb of the tree that the chicken is on. A screech owl is a wise bird and is not going up against that chicken about that high [indicating], because that chicken would club the head off of that screech owl. And there they are on that limb together, the chicken and the screech owl. And the screech owl waits until night, when the chicken becomes sleepy and bewildered. And the screech owl sees the chicken sitting on the limb, and he says, "I can not lick this chicken; I have got to have some system in order to beat this chicken."

And the chicken does not fear the screech owl because he sees the screech owl is so little, and he is not doing anything anyhow; the screech owl has not yet done anything, and so the chicken does not object to his sitting on the limb.

But the screech owl after a while leans up against the chicken like this [indicating]. Well, the chicken is not very comfortable with the screech owl leaning up against her, so she moves farther over on the limb. Then she goes to sleep. She says to herself, "Rather than argue with this fellow I will just move over."

Then when the chicken goes to sleep the screech owl moves over some more. After a bit the chicken says, "Aint that funny; there is that screech owl up against me again; I will just move again." And the chicken moves again; and then when the chicken goes to sleep the screech owl moves over and leans on the chicken again.

And in that way, when the screech owl gets the chicken out on the limb like this [indicating]—it is funny why a chicken which flies so well is yet afraid of falling off a tree. I could never understand that.

But this chicken tries to hang on with her bill and claws to keep from falling on the ground. It would not hurt her a bit to fall, but she does not know that.

Then the screech owl gets her in that position where she is helpless. Then the screech owl gets her on the head—and there is a dead chicken. [Laughter.]

Now, of course, the owl had done nothing to hurt her, and she had no reason to think that the owl would, because the owl had acted so very politely to her when he roosted on the limb. However, the owl put one over on her when she was not looking.

Now, the amateurs are very scared of the Navy for some reason. I do not know why. The Navy has got battleships, and they clean up so good when they undertake a job that it seems that you have not got much chance. When they clean you up once you can not get back.

Mr. EDMONDS. You are not trying to tell us that the Navy chases chickens, are you? [Laughter.]

Mr. CHAMBERS. No; not like a screech owl. No; I have been looking around Washington to see if anything like that happens, and they do not do it.

Well, anyway, the amateur has had experience with the Department of Commerce, and they have pleased the amateurs so well that

the amateurs do not want to change. You know how you hate to leave your home that has been so pleasant; you are always doubtful whether you are going to like the new one.

Every time anybody has brought a bill up—this particular bill was brought up by the Navy Department; that is, they seem to be the ones that would like to have it put through; and that is true in almost every instance. They have kind of forgotten about the amateur and left him out.

There was a bill before this one that came up, that had the word "amateur" in it. So we thought they had left that in the bill this time; and we were very much pleased with that, and said they had probably changed their attitude of ignoring us.

But then another bill was presented in the place of that, and, of course, we looked for this word "amateur" to be in there; but we did not see it. Of course, we had nothing else to go by, but what we found in the printed bill. And when a thing becomes a law, if it is not in there, you can not say, "I thought they meant that to be in there"; because usually, in courts they do not go by what you think. You dare not think; you must simply have the facts and statements.

So you gentlemen ought not to feel funny because some of these amateurs feel antagonistic, because some of them think that the Navy Department wants to put them out of business.

If those amateurs had been put into this bill, they might not have thought anything about it; but when they saw that the word "amateur" was left out of the bill, they got scared.

I would not like to see this proposed bill go through, even with that proposed amendment, because in the past the amateur, has, without any doubt, showed that he is of some material value—beyond question. We all agree on that point.

The amateur had been think this way: We had always said the amateur would do something for the Government in time of peril; but they never had a chance to demonstrate that. So, when the war came on, we were glad of the opportunity—we were not glad there was a war; but as long as the war had to come anyhow, we were glad of the opportunity. The war went forward, and the amateurs did such wonderful service in the war that they said, "The time has come to recognize that, and we will go down to Washington with a bill of our own, and we will say to the gentlemen there, 'Gentlemen, you gave us a condition in 1912—a condition which all experts agreed was absolutely useless.'" When that bill became a law in 1912, and when the amateurs went away from this city, after having pleaded with Congress not to pass that bill as it was—they walked away with their heads hung low. I, with many others, thought that he had been trapped; we thought that we had been done.

It was not from any scientific point of view that they made that law, resulting in things being brought to such a successful issue as they are at the present time.

When the war was declared, the amateurs were able to help the Government a great deal. But when they got up that law, they provided for a certain portion of territory that, at that time, nobody thought was usable; it was practically considered as thrown away. And the amateurs kicked so hard, and asked to be left in the field, that they said, in order to quiet them a little, "We will give you amateurs this little territory, up to 200 meters."

Well, we did not like that. But finally Congress voted on it and said, in effect, "That is all you are going to get"; and they cut us amateurs down to half a kilowatt within 5 miles of a navy yard, and 1 kilowatt beyond that limit.

At that time our instruments were so poor that with one-half a kilowatt at that time we could hardly talk anyway.

So I thought, and said to myself, "All my efforts have been wasted, and I suppose the amateurs will lose interest in wireless and drop out."

But time went on and the amateur was not that kind of a man; he did not quit. He came forth, under those narrow conditions which the law allowed him—and if you gentlemen only understood the business and knew how narrow and small the channel was that we were allowed, you would wonder why an amateur would want to go into it at all.

We took this little narrow strip that was sliced off for us and developed it. We have done something, while the rest of them did not pay much attention to us. Generally, a fellow would say, "It is a little amateur up there and he does not do anything." But while the rest of them were not paying any attention, the amateur was working to develop that, because he could not do any better, and he went and developed conditions, by which he raised that condition of that little strip up to a better standard than the strip was at the time the bill was passed before; there is no doubt about that. We were useful in that respect. We proved that we could do something; the war has proven that.

We felt like a man that was handed three measures of meal; we did not take this little wave length and hide it; we took this little wave length and increased it.

And so when we came down here and found that you had another bill before you we could say, "Gentlemen, we have doubled what you gave us; can you not grant us a little bit more?" That is what we were going to ask. But instead of finding a bill broadening our territory, we found that they had squeezed it up by this new bill.

Now, the amateur is a funny person. You might think that you could catch him off his guard, like the screech owl caught the chicken. Not so.

The amateurs wanted more wave length. They got more wave length; but they squeezed the amateurs down on their power. That is not what he wants. He would prefer leaving the wave length as it is, and leaving the power as it is: he would be better off under that condition.

Because, I will admit, that with the present conditions we do not know how to take a 1 kilowatt and get it in a 200-meter aerial and use it to its full efficiency: we do not know how to do that.

But if you leave it that way there is something to work for, and we will try to do it. And who can tell? Somebody will probably find a way to do it, and we may come to you later on and say, "We did not used to do it, but we can do it now." Whereas if you draw a dead line and say we can not cross that dead line—that we can work to a certain place and then we are done—the interest in the work will stop. You gentlemen must all know that unless you have a shining target in this life, something to advance yourselves to and something

to go and get, you lose interest. When we are satisfied, and find that we have no way of developing ourselves, but have come to a place where we have everything we want, there is nothing more in this world that we desire, and we have reached some positive conclusion—when that occurs we die. That is what we are taught.

Now, we do not care to die. We have not come to that place where we think that we have thoroughly developed this thing, and we do not want you to put a fence up by which we can not go any further.

Why not leave it the way it is, gentlemen, until we can probably say, "We now have filled this little space you have given us. We can now take a kilowatt and put it into a little space, say, 200 meters. Now, we want to expand. Can you kindly give us just a little bit more?" Not a big chunk at a time, but just a little bit more, and then a little bit more later. And as we follow after it, keep giving a little bit more. You would not have to give much at a time.

It would be just like raising a man's wages. If you do not want to pay him \$20 a week at first, when he comes to you, you will scratch your head and say, "Bill, you have been here a long time, and I think I can make ends meet if I pay you a dollar more a week." You can do that with Bill's wages every once in a while, and you can be 10 years in raising that fellow's wages from \$10 to \$20 a week. And he will say, "I never had to ask my boss for a raise in my life." He will keep working.

But if you give him the whole \$10 raise all at once, he will say, "I am getting about as much as anybody in this business, and I do not believe they will ever give me any more." He might lose interest in his work.

Mr. SAUNDERS. Let me ask you, in that connection, this question: Do you mean a little more in wave length or a little more in power?

Mr. CHAMBERS. Yes, sir; I would not say right now give him more power, because, under the narrow conditions of wave length, he can not use any more at this time.

Mr. SAUNDERS. You want the amateurs given more wave length at present, do you?

Mr. CHAMBERS. Yes, sir.

Mr. SAUNDERS. What would you fix as the maximum wave length they should be allowed?

Mr. CHAMBERS. I will tell you that a very embarrassing thing stands in the way. We are facing a condition where we are going to run into an international convention which has set conditions, but probably the men that made those conditions realized that the time would come when the art would develop far enough when they would change those conditions. I do not doubt that a bit.

Mr. SAUNDERS. Well, let us be definite. We do not know just what you mean by "a little bit more." You have got a limit of 200 meters, we will say. Do you mean by that that 250 meters would give you more latitude?

Mr. CHAMBERS. Yes; if you gave us the power, but giving us a long wave length without the power would not benefit us.

Mr. SAUNDERS. Well, suppose we leave the power as it is and give you 250 meters in wave length, would that give you an additional field—would that give you a better field than the 200 meters?

Mr. CHAMBERS. Yes; then we could start and develop a little further. I will tell you men, if you only knew the art as it goes—you

do not have to legislate to cut a man to half a kilowatt; you have got it done; only you did not know you had done it. It was probably a little piece of luck on your part; and we were so discouraged, because we had to take such a little wave length that we forgot all about it and went home crying.

But we come to the point where we can improve and improve; and then we come to the point where we have to stop on account of the wave length. Now, you have got the wave length fixed at 200 meters; and I have this big kilowatt; but I come up to where I am using all of it, and the first thing I know I have overstepped my wave lengths, and I will come back. To get back, I have got to take off my condenser, and shorten up my circuit to get down to 200 meters. And what is the consequence? I have to sacrifice power; and therefore, when I have taken out inductance and power to get down to 200 meters, I am back to one-half kilowatt. You see, you are in a position where you can use 10 kilowatts if you want to stick to 200 meters. We would not have any more power than we had under the act of 1912; the power that comes out is a certain amount; and we have to have a certain wave in order to use it. So this wave length is governed by a thing called a "condenser"; and a few turns of wire are connected together, and the wave length is derived from the square root of the products of those things.

So that it would be just as reasonable for you to say to me, "There are 10 quarts of milk over there. You can have it all, provided you can carry it at one time in a quart measure." You have given me the milk, but there is a condition attached to it; you have said, "You must go after it and carry it with a quart bucket; you can have it if you can get it in a quart bucket."

Well, if I did not know about that, that you could not get it in a quart bucket, I might go and look at the milk and look at the bucket; and I would say, "How am I going to get that in the bucket?" Suppose I should pour it out anyhow in order to be spiteful; suppose I should pour out that whole 10 quarts of milk in this bucket just to spite you. That does not do me any good; for when the bucket gets full, the remaining 9 quarts will run on the ground and be lost. I would be doing that simply for spite. It would be like the fellow that walked over the railroad track because he had a grievance against the Pennsylvania Railroad. He had bought a return ticket, and the next day I saw him and he was walking back. I asked him, "Why do you walk back? Did you not have a return ticket?" He said to me, "Yes; I have a return ticket, but I am getting square with the railroad; to get square with the railroad I am walking back." He was spiting nobody but himself.

I might use a little slang once in a while, but excuse me, I do not mean to be personal. You gentlemen have misled the amateurs with a law that you have already got, that is just as tight, just as firm, and just as strong in your grip as you can get it.

But one thing I do not understand is how the Navy handed us this. Because, maybe, they figure like this: 2 and 2 are 4, and 2 and 2 are 22. You know that. But there is another way:

Naught is naught and 2 is a figger,
All for me and none for the nigger.

That is the way some people might figure. But this is six and half a dozen. They say to us, "Fellows, we are going to give you 250

meters." We say, "Hurrah!" But down further on we find the power is cut down.

Mr. SAUNDERS. In that connection let me ask you in respect to the range of your sending or transmission, do you send farther with 1 kilowatt and a wave length of 200 meters, or with half of a kilowatt and a wave length of 250 meters?

Mr. CHAMBERS. Well, I tell you, as far as that goes, technically you might prove that one might be better than the other; but it would be so close that I do not think there would be much argument, because a man could, with his own kilowatt and 200 meters, he can get equal to a half kilowatt of power. A half kilowatt of power under certain conditions will send so far and no farther. And under this amendment they extend your wave length a little and cut down your power, and I do not see that there is much difference, only this way it shuts out any chance of your broadening yourselves.

Mr. SAUNDERS. Under the conditions as I have suggested do you say that the results would be practically the same?

Mr. CHAMBERS. The only thing is that under this amendment the amateur can not expand; this puts a dead line, and he will have to stay where this amendment puts him; whereas the other way there is always a possibility of his expanding, of making the messages go farther, with a given amount of power, whereas this [indicating paper in witness's hand] prohibits that.

Mr. SAUNDERS. You are referring now to these suggested amendments?

Mr. CHAMBERS. Yes; I say that I can not see that they have given anything by it. I can not see that.

Mr. SAUNDERS. Now, have you any amendment in mind to this proposed amendment? If you have one, where would it come in?

Mr. CHAMBERS. Do you mean that you want me to make a suggestion of what I think?

Mr. SAUNDERS. Yes.

Mr. CHAMBERS. Well, I am liable to ask for more power in this bill.

Mr. SAUNDERS. Suppose you did ask for more power; what would you ask for?

Mr. CHAMBERS. Not any more than we used in the past.

Mr. SAUNDERS. What is that?

Mr. CHAMBERS. They allowed us to use half a kilowatt within 5 miles of a Government radio station, and if we were beyond 5 miles they permitted us to use a kilowatt. A kilowatt is a little over 1 horsepower; it is about a horsepower and a third.

Mr. SAUNDERS. If you were within 5 miles of a Government station—

Mr. CHAMBERS. If we were outside of that 5-mile limit—and that means nautical miles—they allowed us to use 1 kilowatt to 200 meters.

Mr. SAUNDERS. Is that satisfactory to you?

Mr. CHAMBERS. We were trying to accomplish what we could accomplish with that.

Mr. GREENE. I want to ask a question.

The CHAIRMAN. All right.

Mr. CHAMBERS. If you gentlemen want to adjourn now, I can come on again to-morrow.

The CHAIRMAN. Well, we want to get through to-night; of course, you understand our time is very limited.

Mr. CHAMBERS. Yes, I know; but I understand that you wanted information, and if I can give it I will do so. I think some of the men on this committee have been asking questions that have not been fairly answered. The gentleman on my right [indicating Mr. Humphreys] asked a question that has not been fairly answered; you [indicating Mr. Humphreys] asked a question that I do not think you got the answer to that you wanted.

Mr. HUMPHREYS. Suppose you give me the answer that you think I wanted. I do not know what question you refer to.

Mr. CHAMBERS. You got into a long discussion, and there was considerable confusion, if I may call it that, and I do not believe that either you or the witness understood when you got through what either one of you wanted.

Mr. HUMPHREYS. Well, suppose you illuminate the situation. [Laughter.]

Mr. CHAMBERS. Well, I will do that, and I do not consider that I am taking your valuable time for nothing. I am here as a servant to help you out. You wanted to know why Dr. Christian objected to that word "receiving" and not to Government stations.

Mr. HUMPHREYS. You did understand what I wanted, did you?

Mr. CHAMBERS. I think I understood what you wanted.

Mr. HUMPHREYS. And you think the rest of them did not, and you think I did not?

Mr. CHAMBERS. It did not appear to me that you did, and I do not think you were satisfied with the answer that you got.

Mr. HUMPHREYS. I did not get any answer. But you understand it now, and you have guessed right.

Mr. CHAMBERS. Now, with that word in here [indicating amendment] the result is that if they wanted to enforce it, so that nobody could have over a quarter of a kilowatt, regardless of where he was in the United States, if they wanted to fix it that way. We amateurs have not only been cut from the kilowatt to one-half a kilowatt, but we have been cut clean down to one-quarter everywhere. Do you see what I mean? That is, not particularly because an amateur was near this station or that station or another station; but if they made these stations thick enough or close enough together—they would draw a 10-mile mark around them and say, "Beyond these marks you can have a half kilowatt." But if they draw these circles thick enough they would touch, and there would be no place left in between; so that eventually this bill would say, and the way this thing is drawn, "A quarter of a kilowatt is the highest you can have." It would not make any difference to this young amateur whether he was near the post office or near the Government station. That was not it. But if they would list these post-office stations with the Government stations the country could become so thick that the amateur would be legislated down to one-quarter of a kilowatt.

Mr. HUMPHREYS. Do you want a longer wave length?

Mr. CHAMBERS. Well, the Navy has shown here that, as they have abandoned the 300 meters—the Navy has shown that they would like to have from 0 to 150 meters, we can not kick about that; we have no good way to use that.

Mr. HUMPHREYS. Do you want a longer wave length? That question is plain; will you please answer it?

Mr. CHAMBERS. If it would not interfere with anybody we would like to have it. And if they do not want to use it, why not give it to us?

Mr. HUMPHREYS. Well, are you satisfied with the present wave length?

Mr. CHAMBERS. Yes; if you leave the power where it is; in the present law we have something to work for.

Mr. HUMPHREYS. Let me see if I understand this; you are going to make this perfectly clear, as I understand it.

Mr. CHAMBERS. Yes.

Mr. HUMPHREYS. Do you want this bill amended so as to give the amateurs a longer wave length? That is a question that can be easily answered.

Mr. CHAMBERS. Yes.

Mr. HUMPHREYS. You want that, do you?

Mr. CHAMBERS. Provided we do not have to sacrifice power.

Mr. HUMPHREYS. I understand; but you want a longer wave length, do you?

Mr. CHAMBERS. Yes; that would open the door for a little wider expansion.

Mr. HUMPHREYS. If you can not get the longer wave length, would you still like to have the same power that you have now?

Mr. CHAMBERS. Yes.

Mr. HUMPHREYS. Is that for the purpose of pouring the milk on the floor, to use the illustration which you have given?

Mr. CHAMBERS. No, sir.

Mr. HUMPHREYS. Well, you are still limited, according to your illustration, to the one-quarter of a kilowatt?

Mr. CHAMBERS. Well, I said when we first got the 200 meters that we could not use it to one-half of a kilowatt, but we have found the way to do it now; and it may be possible, in one or two years we may find some way to get that 1 kilowatt in that same space. If we can improve the sending apparatus we can do it. Now, we may miss it, but there is some possibility of us doing it. And if you leave that condition open we will work for it and try for it, and if we do not succeed there is no great harm done; we will be the losers, because we have been wasting good, valuable energy.

Mr. HUMPHREYS. Now, I think I understand perfectly clearly why those other witnesses said they could operate within 5 miles of a naval or military station, but could not operate within the same limits of a Government station; you have answered that, have you not?

Mr. CHAMBERS. They would not interfere with each other.

Mr. HUMPHREYS. That is the question you were going to make clear. I just want to know whether, in your opinion, you have made it clear?

Mr. CHAMBERS. Yes. If not, I will try again.

Mr. HUMPHREYS. I am entirely satisfied.

Mr. GREENE. As I understand you, you are better satisfied with the law as it is than you would be to have it changed?

Mr. CHAMBERS. Yes.

Mr. GREENE. And under the Department of Commerce, as it is, you are better satisfied than to have that changed?

Mr. CHAMBERS. Yes, sir; I would prefer to leave it alone.

Mr. GREENE. That is what I understood.

Mr. CHAMBERS. Because we did not ask for anything; the amateurs did not ask for anything; we did not bring this bill in.

The CHAIRMAN. Well, we have had your views now.

Mr. CHAMBERS. If you leave it the way it is until the rest of the boys come home, the great number of them, we can then all take part in this discussion, and I do not see why we could not come to a better conclusion than we can now.

The CHAIRMAN. You have given us your views now, Mr. Chambers.

Mr. SAUNDERS. With respect to the development of the art itself, have the experimenters in the Naval Service contributed largely to that development, either in original discovery, or in the perfection of instruments.

Mr. CHAMBERS. I think that most of the development up to the present time has been started by amateurs. Of course, a lot of things started by the amateurs were taken up by men further advanced in the art, to bring them to a commercial condition. Usually, the amateur does not bring it to a commercial condition, but he gives the higher skilled inventor the inspiration, in most cases.

If you read over the inventions from 1835—that was when the first wireless invention came out; some people are not aware that it dates back that far; however, it does. From that time all the way up to the present, you will find that all the development—that is, all the inventions—were made by men in public life; you will not find any anywhere made by other people; or if they are, they are not in the records; if there were, they were selfish and kept it to themselves. There is not in any public print that I can find any record of it.

Therefore we think that there have not been any inventions made by anybody inside of the Government service.

I remember that Marconi was an amateur when he discovered this thing; and you will find that many men are now in the Government service, as commissioned officers; and the discoveries that they claimed were made while they were amateurs; and I think that the amateur is the source of supply for inventors, for operators, and for professionals; and it is just like the good way to cure mosquitoes is to fill up the swamp where they breed. If you do anything that will stop the amateur, you will stop the progress of invention.

I ought not to dwell on the commercial side; but let me say that you gentlemen ought to leave it so that when the amateur gets proficient, he will have somebody to go to to get a job.

Mr. GREENE. Mr. Chairman, will you have the testimony in rebuttal?

The CHAIRMAN. No; we are not yet through with the opposition to the bill, I believe.

Mr. GREENE. Well, there is one matter that I would like to have borne in mind, which Commander Hooper said he would bring to the attention of Capt. Todd, and that is as to the question of the jewelers getting their time by wireless: I understand that the jewelers have not been able to get it since the war broke out; and Commander Hooper told me, as I understood, that Capt. Todd was going to arrange that matter. I make this statement so that the matter will not be overlooked when the representatives of the Navy appear before the committee.

(Thereupon, at 5 o'clock p. m., the committee adjourned until Thursday, December 19, 1918, at 10 o'clock a. m.)

COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,
HOUSE OF REPRESENTATIVES,
Thursday, December 19, 1918.

The committee met at 10 o'clock a. m., Hon. Joshua W. Alexander (chairman) presiding.

The CHAIRMAN. We will now hear Mr. Davis.

**STATEMENT OF GEORGE S. DAVIS, GENERAL MANAGER RADIO
TELEGRAPH DEPARTMENT, UNITED FRUIT CO.**

Mr. DAVIS. Although we were not among the larger companies mentioned by Commander Hooper as having contributed to the work of the Navy Department during the war, we are nevertheless a highly important factor in the development and maintenance of the radio business between the United States and Central and South America. Aside from the radio installations installed in our fleet of ships, we have shore stations in Louisiana and in the following countries of Central and South America: Colombia, Panama, Costa Rica, Nicaragua, Honduras, and Swan Island.

These stations, together with our ships, comprise the system of the United Fruit Co. radio stations, which system has been developed as an adjunct to its commercial interests in the United States and Central and South America, and it is this system which, if this bill is passed and the policy of the Navy as expressed by the Secretary of the Navy in his testimony is carried out, will be utterly destroyed and the efficiency of our great organization—an organization employing 35,000 persons—as a medium of furthering American commerce will have been impaired.

Next to the Marconi Co., the United Fruit Co. is probably more heavily interested financially in radio than any other American corporation.

The political and economic effect which the passage of this bill and the carrying out of the Navy Department's policy will have in Central America are so serious that we request an executive session of this committee to hear them. I wish to add, however, that some years ago, when the United Fruit Co. undertook the development of the banana and sugar industries and the general commerce of Central America and the West Indies, the lack of efficient means of communication was one of the greatest handicaps. At that time, and up until some nine or ten years ago, we were dependent for our communications upon the Government-owned telegraphs of those countries which, being so unreliable and inadequate to give the service demanded, literally forced us to install our own telegraphs and telephones in those countries and also to establish a system of radio stations, connecting with the United States, which would insure communication at all times.

This system of stations was just as necessary, and is to-day just as necessary, not only to our own business, but to American business in general, as is the United Fruit Co.'s continued establishment and maintenance of hospitals, schools, churches, sewerage, and water works, piers, wharves, railways and beacon lights, in the countries of Central America. In fact, our organization has been built up around our ability to communicate quickly between any of the Cen-

tral American countries and the United States and with our ships at sea, and the fact that the principal commodity handled between Central America and the United States is of a perishable nature makes it all the more important that we have the moral and physical control of all means of radio communication having to do with the handling of these ships and cargoes.

In considering our radio system it must, therefore, be taken as a whole and not as individual units, and, as I testified before this committee two years ago, if we lose control of the United States terminal of this system it impaires the efficiency of the entire system, and if the control is lost through the passage of legislation such as is proposed, the effect might easily be so far-reaching as to absolutely destroy the entire system, a system built up only after years of effort and the expenditure of great sums in the furtherance of American commerce.

The Navy Department state that if this bill is passed they will urge the governments of Central America to take similar steps; that is to say, urge those governments to take over our stations and operate them as part of an inadequate and inefficient system, and thus defeat the very purpose for which the installations were made. The Navy Department does not undertake to say where these countries are going to get the funds to take over our stations, or to erect new ones. Perhaps it is the intention to supply them with the stations the same as was done in the case of Panama. In any event, not all of the governments of Central America have such enormous funds at their command that they can, overnight, spend \$200,000 or \$300,000 in erecting a single wireless station, and even though it might be possible for some of them to erect such stations, their operations, if carried on under the same principle that some of their Government-owned land wires are, would be entirely useless for commercial purposes.

The Guatemalan Government station at Guatemala City is an example. The operation of this station by the Guatemala Government has never been a success, and during the Guatemalan earthquakes and since the Government of Guatemala has been almost entirely dependent upon the facilities of the Fruit Co.'s radio system for their radio communication. In fact, it was through the Fruit Co.'s system that all communication was held with Guatemala during the period the cables were interrupted by earthquakes.

During the war, and especially since this country became actively engaged therein, our Government has been forced by the exacting requirements and need of prompt and energetic action, regardless of cost, to depart widely from its fundamental principles in domestic affairs. In various ways there has been a greater centralization of power set up to meet war conditions than was ever thought possible in the United States, and the greatest interest in this country at the present time, apart from the establishment of a stable peace agreement between nations, is in getting the United States back to normal democracy in its Government and restoring freedom of private enterprise in establishing and directing its industries and its trade.

The proposed bill, H. R. 13159, is against this interest, and if passed will set up a complete Government monopoly of the radio-telegraph business in the United States and its possessions, and thus

perpetuate an emergency measure adopted solely to meet war conditions and warranted by war conditions.

We have just fought a great war to make the world safe for democracy, but if legislation such as this is to be an outcome of the war, the United States will have been made unsafe for business. It would be decidedly unsafe for business to go on expanding or even to continue if a firm stand is not taken against measures such as this, which kill individual effort and initiative.

The business men of the country are being urged to expand American trade and enterprise in all directions, but even at this time we have certain departments of the Government endeavoring to seize the principal mediums of communication, without which there can be no expansion in trade, and thrust Government ownership on this country against the wishes and interest of the public.

It is un-American. It is following the principle of autocracy rather than of democracy to encourage legislation which would permit any department of the Government to extend its powers by seizing business enterprises which have reached their high state of efficiency by the individual initiative and tireless work of the man power of the country. I maintain that peace should bring certainty to every form of legitimate enterprise as a practical application of our right to life, liberty, and the pursuit of happiness rather than uncertainty under Government ownership.

Under this bill the power of the Secretary of the Navy would be almost unlimited in radio matters, and that part of the general public depending upon radio as a means of communication, either with ships at sea or with foreign countries, would be subject to his slightest whim. And it is conceivable that the perpetual censorship which Government ownership of means of communication would necessarily involve would be a source of great concern and annoyance to those using any medium of communication under Government ownership.

Admitting that the present administration of the Navy Department is the most efficient in the world, it does not follow that subsequent administrations would be equally as efficient and would not exercise in a tyrannical manner the powers given it in this bill. There is not a single provision in this bill to protect the general public from the abuses which, as has been demonstrated, particularly in Germany, always follow Government ownership; on the contrary, it empowers the Secretary of the Navy to administer the radio business of the country under whatever regulations he sees fit, even to censor communication in time of peace, if he so desires, and in effect gives him control of interstate and intrastate as well as international communication without restraint. It gives to him the power to close stations in any State in the Union, regardless of the public or economic demand for the continuance of such stations, and it is left not to public demand nor the demands of business, but to the Secretary of the Navy, to decide whether the United States may take full advantage of the commercial possibilities afforded through the development of radio communication.

Suppose that Congress does put the radio business of the United States into the hands of the Navy Department, could the Navy Department develop the commercial possibilities of radio? They *haven't* the commercial connections or facilities in foreign countries

to compete with foreign-owned stations, and if they had the complications sure to ensue should a department of the United States Government openly enter into competition with private interests under foreign Governments would open the door to international difficulty which might have serious consequences.

Aside from not being able to maintain a commercial organization in a foreign country, the Government has not such a permanent organization at home as is necessary to build up and take care of commercial business. The naval officers who would be in charge of various districts in the United States would continually be shifted from shore to ship and vice versa and the personnel, whose term of enlistment is four years, is an everchanging one. It is therefore perfectly obvious that it is impossible for the Navy to maintain an organization which would approach a private organization in efficiency. There would arise in this connection the question of everchanging policies in the different attitudes of various administrations toward the subject, and there is also the commercial development of inland radio.

The passage of this bill would mean that if some community of farmers or fishermen or anyone else in, say, Mississippi, Virginia, Louisiana, or Texas wanted to secure a means of communication from some isolated place and it was either too expensive or was impracticable to put in a telegraph or telephone, the privilege of installing radio would be denied them.

Prior to the war great strides were being made in the development of radio to and from moving trains. Several railroads had established stations and were conducting experiments in an endeavor to perfect this communication. Under this bill it would be unlawful to establish these stations permanently. It would be unlawful to establish a large station in the vicinity of New York and in the vicinity of San Francisco to be used for the purpose of wireless telephony, even though by the installation and operation of this station in connection with the land telephone it would materially reduce telephone charges between New York and San Francisco and other points and even though no interference would result. In short, this bill would curtail private enterprise to such an extent that it would be unremunerative for inventors and scientists to devote any considerable time to further development of the art.

The proponents of this bill contend that there is a demand for Government ownership of radio. Who is making this demand? Certainly not the general public. The steamship companies are not and neither are the radio companies. There is no demand for it by any responsible public body. On the contrary, public opinion is setting itself against Government ownership. Former Supreme Court Justice Charles Evans Hughes, speaking before the Institute of Arts and Sciences, discussing conditions following the war, asserted that "Government enterprise tends constantly to inefficiency." He characterizes as "enemies of liberty"—

All those whose interests lie simply in extending the activities of Government so as to embrace all industry. It can not fail to be observed that even in connection with the war, despite the endeavor and patriotic impulse of countless workers, inefficiency in important fields of activity has been notorious. The notion that the conduct of business by Government tends to be efficient is a superstition cherished by those who either know nothing of Government or

who know nothing of business. The instinct of the American people, I believe, can be trusted to thwart the insidious plans of these enemies of liberty who, if given their way, would not stop short of a tyranny which, whatever name it might bear, would leave little room for preference as compared with Prussianism.

In a speech before the United States Chamber of Commerce at their ninth annual dinner on December 5, Charles H. Schwab said—

Our great fleet of cargo carriers will not be developed to the extent that it should be developed and will not be in a position to compete for the business of the world as it should unless it is privately owned. Private capital and private ownership will alone develop it.

Other public men have expressed themselves in a similar manner. Mr. Schwab also said in his address before the chamber of commerce at Atlantic City on December 4—

The real development of any great enterprise depends on the individual enterprise of the American business man. I do not believe we will ever get the full economical development of any great branch of American industry that is not developed under private enterprise and by private capital.

Expressions such as these coming from men who have been so closely identified with Government ownership and operation during the past 18 months are very significant. There is only one conclusion, and that is that these men who have had greater opportunities to study the practicability of Government ownership and operation have concluded that such ownership and operation is not only undemocratic, but inefficient and is an unsafe policy for this country.

The proponents of this bill argue that Government ownership of radio is necessary in upbuilding the American merchant marine. It is true that radio is a valuable adjunct to the merchant marine, but when we have such men as Charles M. Schwab warning us that unless the merchant marine and its facilities and adjuncts are privately owned they can not be developed, it is time to take some definite and decisive action which will defeat any attempt on the part of any governmental department to set up a Government monopoly of such an important part of our merchant marine business as the radio. It is true that this particular bill does not prevent private interests from owning and operating radio apparatus on board steamships, but it does prohibit private interests from owning and operating stations on shore, which are the terminals for the radio communications from ships, and if we are to have Government ownership of these terminal facilities we might as well have Government ownership of all steamships, railroads, or telegraph lines, or any other business requiring terminal facilities.

The leading editorial in the Detroit Free Press for November 27, 1918, is entitled "And Now the Radio Companies." It says:

A statement prepared by the Navy Department tells "Why the Government regards it as necessary for the Navy to operate or control radio stations in this country." We will not attempt to refer to all the reasons offered by the Navy spokesman: none of these is especially convincing. One of them, however, is quite interesting. This is a contention that, except in very special circumstances, private radio companies have failed to make adequate financial return, but that in most cases no profit has been made except through the sale of stock. The business experts of the Navy Department state that this is because a complete monopoly is necessary. The country also is given the astonishing information that the transoceanic telegraphy is not a serious competitor of the cable. So, in a considerate, paternalistic mood, the Government has decided to save

private capital from hopelessly profitless enterprise by eliminating opportunity to engage in it. It seems pertinent in this connection to note that none of the State socialism schemes now being urged is the result of any demand by the people of the country. They are all distinctly administration urged; they are being imposed on the Nation.

In his annual report Postmaster General Burleson again asks for Government ownership of the telegraphs and declares that the principle of Government ownership has proved a success under his direction. No convincing proof of this alleged success is furnished. The telegraph business is now a Government monopoly. Individual initiative, competition, and pride of service is in the background, and like all Government monopolies the tendency is not toward efficiency but toward inefficiency and waste. In fact, Capt. Lipsner gave waste and inefficiency in the aereo mail service as the reason for his resigning from the superintendency of the air mail service, saying that he could not be party to wasting the taxpayers' money in carrying out the ideas of the Postmaster General.

Now, are you going to permit the passage of this bill, which would set up a Government monopoly of the radio business, knowing full well that it, too, will sooner or later resolve into an autocratic service and lend itself to uneconomic expenditures and perhaps waste of public funds? The Postoffice Department is for Government ownership of all telegraph business, but it is not in favor of that ownership, or any part of it, being vested in the Navy Department. If this bill were passed the Post Office Department would doubtless endeavor within a short time to have the control vested in them rather than in the Navy.

During the past year I have watched very carefully for any demand on the part of the general public for Government ownership of radio, but, aside from a demand made by the Radio Division of the Navy Department and of course the Post Office Department, there has not been, so far as I have been able to ascertain, the slightest demand for Government ownership. Not even the labor unions are in favor of Government ownership of radio. They realize that if such ownership is vested in the Navy Department it will mean that the stations will be manned by naval radio operators receiving from \$30 to \$70 or \$80 per month, whereas under private control the operators will receive from \$75 per month upward, mostly upward.

As has been stated on numerous occasions before this committee, Government ownership has been tried in various countries of Europe and has been found wanting. It was to America that Marconi brought his invention, and it is in America that the development of that invention has attained the highest perfection—a perfection which even Marconi himself seemed to realize could not be obtained in Europe. The telephone, the telegraph, the railways, in fact, all public utilities, have reached a higher state of perfection in this country than in any other. Why? Because, as Schwab says, "The real development of any great enterprise depends upon the individual initiative of the American business man." And if this bill is adopted the blame for stifling this individual initiative in one of the greatest modern developments of science will rest with the proponents of this bill. The greatest development in radio apparatus has come not from any government but from individuals in the employ of commercial radio companies. I refer particularly to the valve or audion type of receivers and sus-

tained wave transmitters, all of which had their inception under private rather than governmental enterprise. The recent discoveries of Mr. Weagant, which all of us confidently hope will go a long ways toward solving the problems of interference and static, is another example of the development by private enterprise rather than by governmental enterprise.

Government ownership of public utilities in Germany had probably reached its highest state of perfection just prior to the outbreak of the war in 1914. They had been developed as Government monopolies for years, with the sole end in view, as we now know, of the expansion of Prussianism throughout the world. Do you suppose that Germany would have dared to embark on such a wild scheme of world domination unless she had first established complete governmental monopolies of all industries which they thought would insure success? The result of years of Government ownership in Germany was to establish an autocracy which, having through these Government monopolies such absolute control of the people, brought about the greatest war in all history. Fortunately for the world, this autocracy was overthrown; but it was no sooner done than our own governmental authorities have bills introduced in Congress which, if passed, would in time tend to set up an autocracy such as the one which we have just overthrown.

This proposed bill for Government ownership of radio is only the beginning. If it passes, I believe that the cables will be next, then the telegraph lines, then the telephone lines, and then spread to other industries until we in this country are as completely dominated as were the people of Germany. I also believe that if this bill, which places control of commercial radio in the hands of the Navy Department, is passed, the Post Office Department will take that control away from the Navy Department in less than five years' time. In fact, the Post Office Department in the hearings on H. R. 19350, on January 11, 1917, stated that while they favored Government ownership of radio they did not favor such ownership being exercised through the Navy Department, but felt that it should be exercised, and ultimately would be exercised, through the Post Office Department.

As further evidence of the complete failure of Government ownership of public utilities, one needs only to refer to the book by the great French publicist, Yves Guyot, "Where and Why Public Ownership Has Failed." Guyot as vice president of the Municipal Council of Paris, Deputy to the French Parliament, minister of public works for four years, and president of the Political Economy Society of Paris, was in a most excellent position to study and compare Government ownership with private ownership over a period of years, and he says:

1. Public monopolies kill the spirit of initiative by destroying competition. The ultimate result is fatal industrial lethargy.
2. Public operation emphasizes the special demands of the community rather than fundamental necessities, and provides opportunities for graft and corruption.
3. Operation by States and local governments is more difficult than private management. This is a rule which holds good, despite a few apparent exceptions.
4. Government employees, paid for their loyalty to the public interest, come to consider their position as their own private property, and the more numerous

they are, the more they incline toward exchanging their rôle of subordinates for that of masters; from being directed they become the directors.

5. Intervention of the public power has an adverse influence upon the distribution of wealth; sometimes it is the whole body of taxpayers who must suffer for the sake of some privileged class, sometimes the consumer is defrauded to benefit the taxpayer.

6. Neither Government nor municipal monopolies are novelties; they are antiquies; they are not indicative of evolution but of retrogression. The motive behind public undertakings is often political or administrative influence for their promoters.

7. The propaganda of Government ownership has established more firmly than before the truth of the following industrial laws:

First. Neither States nor municipalities should attempt tasks especially adapted to individual effort.

Second. In the case of those utilities in which the public interest is general there must be a physical and morally responsible body accountable to the public on one hand and the service on the other, and protected by contracts against vacillations of public opinion and the extortionate demands of interested groups.

In drawing these conclusions Guyot is not influenced by theories, but by facts gleaned while he was minister of public works of France—where they have had Government ownership for years—and from travel and study in other countries where Government ownership of public utilities has been established. And yet in spite of our knowledge of the inefficiency of Government ownership in Europe, in spite of the proof of that inefficiency as compared to American commercial efficiency, in spite of the warnings of our own countrymen who have administered both private and governmental ownership and have warned us that it is only under private control that we can hope to maintain efficiency, we have certain departments of our Government urging us to try out in this country a policy which is admittedly a failure wherever it has been tried.

Statements have been made before this committee to the effect that the radio business does not pay, and for that reason commercial companies are glad to turn it over to the Government. I want to assure you that we will be anything but glad to be forced to turn over to the Government our radio business, the result of years of effort and the expenditure of large sums. Commander Hooper was in error when he stated that we favored this bill or previous bills which would destroy such an essential part of our steamship business.

The Navy Department seems to think that it is a matter of little moment to us as long as we receive "just compensation"—and "just compensation" as it can be defined under this bill would not begin to compensate us for the amounts expended in the development of this service, let alone the enormous losses to our business which are bound to ensue through lack of moral control over the operating force. As I read it, "just compensation" under this bill would be the physical value of the properties and the good will. No provision is made for reimbursing companies such as ourselves for amounts expended in the development of the entire system or of the particular unit which would be taken over. The physical value of the station may be \$100,000, but an outlay of \$300,000 may have been made in perfecting the plant to bring it to its present stage of efficiency. Nothing is said in the bill about compensation for this expenditure, but on the contrary all chance of earning even the interest on the entire amount is taken away.

For example, we at New Orleans have two pieces of property, both carried as a wireless investment. The present station is located on one piece and the other is being held pending the installation of a distant control system. There is nothing in this bill which would compensate us for the loss of the second piece of property. Certainly the Navy could not take it over under the terms of this bill, as there is no wireless apparatus located in it at the present time. Even if the bill were passed it would be decidedly unjust to the radio companies who have brought the art to its present stage of efficiency and commercial development merely to take their lands at their physical value and not provide for reimbursement of sums which have gone into the development of the property and which are not evidenced by physical property at the present station.

Among other things the Navy Department are urging the passage of this bill on economic grounds. Where or how they expect to effect economics in operation has not been clearly stated. However, it has been our experience that the operation of merchant vessels and commercial shore stations by the Navy Department is not economical.

When certain of our ships were commandeered and placed in service as transports the Navy Department took over the operation and maintenance of their radio. At the time the ships were turned over to them the radio was in good condition and repair, but within a very short time we began to receive requests to send to the commandant, navy yard, New York, certified checks for amounts varying from \$25 to \$125 to cover the cost of repairs to the radio apparatus. These letters stated that the difference between the amount remitted and the cost of the repairs would be returned to us. When the first of these letters were received we inspected the ships ourselves to ascertain just what these repairs were, and found in each case that they were minor repairs which, under our own system of inspection and repair, could have been made at the expense of a few dollars. Later, after the repairs had been made, some of them by the Navy department, we received bills for \$25 and \$30 to cover repairs which we could ordinarily make with our organization for \$4 or \$5. This is true not only in one case but in nearly each and every case which came to our attention. I do not say this as a criticism of the officials of the Navy Department, but rather of a system which lends itself to such uneconomical ways of doing business.

At our New Orleans station we maintain a night and day watch with four men. When the Navy Department took over the operation of this station I am informed 12 men were assigned there.

So, when we come down to a question of economy in operation, it seems to me there is no question but that the system under which the Navy Department are forced to carry on business is exceedingly uneconomical from a commercial standpoint.

In commercial business the law of supply and demand must govern; in the Navy military considerations must govern; and, if you turn over radio commercial business to the department they, taking, as they must, the military view first, last and always, must do things in a military way rather than in a commercial way, with consequent economic losses.

Another reason given by the proponents of this bill for Government ownership of radio is interference. This question was discussed at great length at the hearings on a similar bill some two years ago, and it was brought out at that time that the stimulus of commercial return would in time overcome this problem. Interference is caused by the sending of messages. Now, the mere fact of Government ownership is not going to reduce the sending of messages unless you also restrict the number of messages to be sent by any one station. The problem is the same to-day in radio as it was in the early days of the telephone—the problem of several messages over one wire, or, in the case of radio, several messages simultaneously through one station. In the case of the telephone science overcame the difficulty and science is overcoming the difficulty in the case of radio. None of the commercial companies that I know of have complained that they were unable to do business on account of interference. The only complaint is from the Navy Department, and certainly if the commercial companies are able to get along under present conditions, handling the volume of business they do without undue interference, the Navy Department should be able to do the same.

Prof. Pupin, who invented the means of preventing interference on the telephone, testified before this committee two years ago that science can and will, if given a chance, completely solve the problem of interference and static in radio.

You have heard Lieut. Cooper testify that in one room in the Navy Department they can send and receive from five stations simultaneously. A comparatively short time ago this was unheard of. The apparatus had not been perfected to a point to permit of it, and how can we foresee that further development will not completely eliminate this interference question? However, if you try to legislate interference out of existence, what will be the use of inventors and scientists spending valuable time on this problem? With interference legislated out of the way the development of the art would be curtailed and the use of radio communication by the public restricted.

Through its purchase of the shore stations of the Marconi Co. it seems to me that the Navy Department have gone a long way to eliminate any interference. Those stations comprise the greatest system of coast stations for ship-to-shore work in the United States, and under existing laws the Navy can open them to commercial business. I understand that in taking over these stations the Navy Department have secured an agreement from the Marconi Co. to the effect that the latter will not reerect commercial shore stations in competition with the Navy. Whether or not this is in violation of the Sherman antitrust law is not for me to say, although if we compare it to the agreement between the American Telephone & Telegraph Co. and the Western Union Co., which the Attorney General prevented being carried out, it looks as if the Marconi-Navy agreement might be in direct violation of the spirit of the Sherman law. In any event it is safe to assume that had two commercial companies entered into any such agreement they would have been in danger of prosecution by the Department of Justice.

Now, in view of the purchase of these stations, and in view of the existing laws which permit the Navy to open them up to commercial

business, where is the need for any further legislation? Why should the Navy seek to prohibit private enterprise from entering this field unless they are afraid of commercial competition? And how are the Navy, who are not a commercial body, and who are not organized along commercial lines, going to keep in touch with the commercial demands. They are trained along military lines and must consider everything from a military standpoint, with the result that commercial business would have to suffer.

What we need more than anything else in radio is a little flexibility in the international convention and in the law. Under the international convention the wave length to be used by all ships is definitely fixed, and this prevents ships taking advantage of the advances in science in the way of utilizing other wave lengths. Any law that is passed now by this Congress is not going to change the rules and regulations of the international convention. We must abide by those rules until the meeting of the next international convention and the formulation of new regulations by that body, and I want to say right here that I hope at the next radio conference the commercial interests in radio can have representation, something which, so far as I have been able to determine, they did not have in the last convention. The delegation from the United States should be large enough so as to include at least one man from a commercial operating company who can present to the convention the commercial side of the questions which will arise.

Section 3 of the bill in effect provides that no station for any purpose except experimental and technical school purposes shall be erected in any State in the Union. It does not say this in so many words, but that would be the effect of this section, as it is a practical impossibility to put up a station, which, with the delicate apparatus we have to-day, can not be heard beyond the limits of the State. This, to my mind, infringes the State's rights. Under this section you could not erect two stations in the interior of a great State like Texas regardless of whether such stations caused interference or not, merely because they might be heard in Oklahoma.

Section 5 of the bill might justly be termed a "camouflaged" section. It gives the Secretary of the Navy almost unheard-of discretionary powers, and where is the man who is going to invest \$25,000 or \$30,000, or more, in erecting a wireless station to be used only for such period as is deemed proper by the Secretary of the Navy? Under this section the Secretary is not even compelled to issue a license. It merely says he "may do so."

This bill might also and probably would be interpreted to cover sound signals transmitted through water or the ground by means of an electrical system. Most of us are aware of the work of Prof. Fessenden in this connection and know that by means of electric oscillators he has been enabled to send messages 50 or 75 miles through water or the ground, and has even telephoned a distance of 15 or 20 miles, but under the terms of this bill that system of communication would become a Government monopoly, and if private interests wanted to install some such system of communication, say between Minneapolis and St. Louis, down the Mississippi River, it would be

impossible for them to do so. They would have to apply to the Navy Department and the Navy Department would have to come to Congress to get an appropriation, and like the telegraph and telephone in early days when it was under the Post Office Department, Congress might naturally balk at spending public money on something so new and hazardous, with the result that communication would not and could not be established.

Under this bill it would be impossible to install stations for public communication between any States in the interior of the country, whether they would cause interference with sea signaling or not, except those stations be manned and operated by the Navy, and I very much doubt whether anyone in the Navy would be competent to judge whether Denver should have radio communication with Topeka, or whether a group of farmers in Missouri should have radio communication with some other group in Wisconsin. In any event, this bill removes all possibility of development along those lines—a development which, if we can judge from other means of communication, is a perfectly logical one.

I am in favor of giving the Navy all the wireless stations and wireless equipment it needs for military purposes and military training, or for anything that will enable it to maintain first place among the navies of the world.

In time of war the Navy can always exercise the same exclusive and effective control over all radio stations that it has just been exercising during the recent emergency, but if this bill is passed and the Navy undertakes the commercial development of radio, you will upset a perfectly good military organization by forcing it to engage in a field far removed from its training and proper sphere of activities, do a gross injustice to private American enterprise already actually engaged in this business, open the way for serious international complications, and artificially hamper and discourage individual initiative and inventive genius of Americans in developing and protecting one of the most important and promising discoveries of mankind.

I just want to add a word here about the London Radio Convention. Under the present convention, the London convention of 1912, two wave lengths were fixed for sea signaling; that is, for what we call general public correspondence. I think the wording of the regulation is that two wave lengths are authorized for general public service between ships at sea and shore, one of 300 meters and one of 600 meters.

Now, there is nothing in this bill, there is nothing this Congress can do, to change that regulation. And as interference is caused by the sending of messages, and as the international convention requires us to send those messages on 600 meters or 300 meters, how can you do anything now to legislate interference out of the way? You must leave it to science, and the London Radio Convention recognized that when it made that law.

Mr. BANKHEAD. Who represented the United States in that international convention?

The CHAIRMAN. I think Capt. Todd was the representative of this country to the London convention which made these regulations.

Mr. DAVIS. I referred to the London Radio Convention. I understand we had an American delegation to the London Radio Convention of 1912.

The CHAIRMAN. I say, I think Capt. Todd was a member of that conference.

Capt. TODD. I should be glad to answer any questions about that.

Mr. DAVIS. On that delegation we had any number of governmental representatives, but as far as I know we did not have a single commercial radio man.

The CHAIRMAN. I do not know that you lost anything by that; I have never heard anybody questioning the wisdom of the regulations.

Mr. DAVIS. I am not questioning the wisdom of the regulations.

The CHAIRMAN. These regulations were primarily, I think, for the ship-to-shore business. I do not know whether they extended beyond that.

Mr. DAVIS. Mr. Chairman, I have always observed that in any convention of such wide scope as the London Radio Convention if America was represented an American business man was there.

The CHAIRMAN. Do you think it would have done any good if you had been there?

Mr. DAVIS. We could probably have aided in the discussion; probably we would have aided it a good deal.

The CHAIRMAN. I do not know anything about that convention. All I wanted to do was to differentiate between that convention and the one on safety of life at sea. You seemed to be under a misapprehension about that. That was the convention in which I was chairman of the American delegation.

Mr. DAVIS. There has been a great deal of discussion before the committee about the monopoly of radio. Mr. Nally said he hoped to obtain 100 per cent. I do not like to tear down a house of cards, but I will assure you or anyone that the United Fruit Co. would have prevented, through the operation of its system, the entire monopolizing of the radio business, and will if this bill is not passed.

Mr. HARDY. And you think the United States is not big enough to prevent a monopoly as to them?

Mr. DAVIS. It is not a question of being big enough; it is a question of the demands of service.

Mr. HARDY. What I am suggesting is that your company is so powerful and strong they are not afraid of being trampled down by a powerful monopoly?

Mr. DAVIS. We were not always powerful; when we went into the radio business we were one of the smallest of the radio companies.

Mr. HARDY. As a matter of fact, a private monopoly can not crush something that is nearly as big as it is, can it?

Mr. DAVIS. I have never heard of it being done; no, sir.

Mr. HARDY. So your company is pretty nearly independent of the effects of a private monopoly?

Mr. DAVIS. Yes; we are independent, except in the sense that we must come to the Marconi Co. or somebody else to secure patent rights. The granting of a patent gives them a monopoly, and no matter how big you are you can not break that down.

Mr. HARDY. You do not maintain as many different stations on each side of the water or as many of them as may be needed, but you are in a measure independent of the Marconi monopoly?

Mr. DAVIS. We are independent of any monopoly.

Mr. HARDY. Exactly; but how many other people are in your position?

Mr. DAVIS. Any number of them, if they want to engage in the business. The Alaskan Steamship Co. did it.

Mr. HARDY. It was said that Mr. Nally's suggestion here the other day was a pipe dream.

Mr. DAVIS. If Mr. Nally or anyone else can show any big company that he can give better service and cheaper service than they can provide for themselves you may rest assured they will take it.

Mr. HARDY. Oh, all the big companies can go out for themselves, but the public generally can not do that. You understand very well that a big, powerful corporation, like the Armours, for instance, can handle a good deal of freight for themselves, and the United States Steel Corporation does not have to submit to exorbitant freight rates. But the public has to submit when competition comes in. You think the remedy against private monopoly is regulation and restriction?

Mr. DAVIS. Yes, sir.

Mr. HARDY. Do you know it has taken at least 12 years—and we have not got it yet—to obtain an interchange of transfers between the two alleged separate street car systems in the city of Washington?

Mr. DAVIS. I have heard so.

Mr. HARDY. We have regulated, but we do not accomplish anything.

Mr. DAVIS. On the other hand, Judge Hardy, we have the Food Administration and the Fuel Administration, who have administered to 100,000,000 people by regulation, and I believe it was pretty successful.

Mr. HARDY. That is one thing in this administration you seem to think is a success, but everything else you think is not?

Mr. DAVIS. No; I have not said that.

Mr. HARDY. You are criticizing the inefficiency of this administration because it has not been economical. Has anything been economical?

Mr. DAVIS. I have not criticized this administration at all. They have been forced by circumstances into enormous expenditures.

The CHAIRMAN. Let us not get so far afield; let us stick to this bill.

Mr. HARDY. I should like to ask some questions along the line on which the gentleman has been speaking. You spoke of one difficulty in the way of a Government-owned service that it could not cooperate with other countries. Is there any reason why the service owned by the Government in this country could not form the same kind of cooperation as a private monopoly could?

Mr. DAVIS. I do not think they could; no.

Mr. HARDY. You think that the naval service here could not make arrangements with other companies just like the Marconi service does?

Mr. DAVIS. They could not make as good arrangements, because they have not the authority nor the personnel to go out and solicit business.

Mr. HARDY. Your judgment, then, is that it is absolutely impossible for a government agency to accomplish anything?

Mr. DAVIS. No; I do not say that.

Mr. HARDY. They could not have the agents to go out and make these arrangements? What I want to know is why the Government can not make the same kind of arrangements, if they own the business in this country, that you could?

Mr. DAVIS. Merely because they are the Government.

Mr. HARDY. Because they are incompetent.

Mr. DAVIS. Not because they are incompetent, but because they are bound down by laws which would not permit a department of the United States Government to go into foreign countries and solicit business from privately owned concerns.

Mr. HARDY. You think, then, the laws would be more liberal toward a private corporation and private monopoly than toward the Government itself?

Mr. DAVIS. I think they would; they always have been.

Mr. HARDY. I just wanted to get your point of view. You said this bill would make inventions unremunerative, because of lack of competitive markets?

Mr. DAVIS. Yes.

Mr. HARDY. Would you not have the same condition if you had a private monopoly?

Mr. DAVIS. Well, but you can not get a private monopoly.

Mr. HARDY. That is a question between you and Mr. Nally. He thinks you can get a private monopoly, and I think, so too, except in the case of some big company like your own; you can run your own business.

But now let me ask you this: You spoke about the Government's operation of this wireless service being inefficient during the war, notwithstanding the patriotic impulse of the public generally to serve. Were not other departments—the railroads, for instance—inefficient before the Government took them over? Were they not suffering from a congestion?

Mr. DAVIS. I know, but it was not the fault of the railroads that they were inefficient.

Mr. HARDY. Oh, you are willing to excuse the railroads under private ownership, but when the Government takes charge you attribute it to Government ownership? Was not everything during this war in a condition of confusion?

Mr. DAVIS. Why perpetuate that confusion in time of peace?

Mr. HARDY. Was not the confusion the result of the conditions of the war? You are laying it to the Government, and it was applicable to private enterprise as well as to the Government, was it not?

Mr. DAVIS. I merely quoted what I did about Government ownership to bring before this committee the fact that wherever Government ownership had been tried it has proven a failure.

Mr. HARDY. But the point I am making is that you are blaming Government ownership with the conditions that existed during the war?

Mr. DAVIS. No; I quoted here from Yves Guyot, and he has shown in his writings that Government ownership in Europe prior to the war has been a failure.

Mr. HARDY. But you can find plenty of other writers who say just the contrary?

Mr. DAVIS. I have never seen any who put up any good argument for it.

Mr. HARDY. Well, of course, you did not appreciate the argument. I have seen quite a number of them that uphold the efficiency of the German railroad ownership, saying that it is economic. You quoted Mr. Schwab as being opposed to Government ownership. Would it not be just as reasonable to expect Mr. Nally there to favor Government ownership? He is the head of a wonderful combination, is he not?

Mr. DAVIS. Mr. Schwab has always been known as a very fair, broad-minded man. He was called upon by President Wilson to come down here and put his brain into this thing.

Mr. HARDY. I want you to understand that I do not attack the honesty or sincerity or patriotism of a man because he believes in his own interests. If I had a great private enterprise I would not want the Government to take it over, either. Mr. Schwab, however, is the head of one of the great combinations that has been dominating the production of all steel projects here for the last several years. Do you expect that kind of a man to favor Government ownership?

Mr. DAVIS. He has had a chance to look at it from an unbiased standpoint.

Mr. HARDY. Now, I want to know why you are not willing to trust the Marconi system with the administration of your wireless, but want to establish your own wireless?

Mr. DAVIS. Because we have tried the Marconi, the De Forest, and the Government, and they have none of them been able to satisfy us when it came down to our own radio communications. We are dealing in a perishable product, and we must have moral control over our operating forces.

The CHAIRMAN. What do you mean by "moral control"?

Mr. DAVIS. The right to dictate to them.

Mr. HARDY. If I understand you rightly, you are not willing to trust the Marconi monopoly, the Government monopoly, or any monopoly?

Mr. DAVIS. No.

Mr. HARDY. You want your business run by your own wireless system?

Mr. DAVIS. Just so long as no one else can improve that wireless system and give us the same service at less cost.

Mr. HARDY. And the minute they did give you a service to suit you at a cost to suit you, you would let them do so?

Mr. DAVIS. Yes.

Mr. HARDY. Now, if you are not willing to allow the Marconi Co. 100 per cent monopoly, but insist upon breaking it up, do you think the naval service of the United States ought to be willing to put themselves in the hands of a monopoly?

Mr. DAVIS. They are not doing that. What the naval service is doing is to make it illegal for us to engage in the radio business.

Mr. HARDY. Are you in favor, then, of the naval service maintaining its own radio system for the naval ships?

Mr. DAVIS. Certainly.

Mr. HARDY. Now, then, there is a question of economy. If the Navy has shore stations all around the United States, on which they must maintain the overhead charges and make infinite expenditures in order to be sure they would not be hindered by a private monopoly, just as you maintained your system, do you not think it would be economic to let that great system of shore stations established, and necessarily established, for the benefit of the Navy be used for commercial business also?

Mr. DAVIS. But in that connection why make it illegal for an American citizen to engage in the same business?

Mr. HARDY. Would it not involve an immense and useless expenditure to have two or three systems, all for the same class of business?

Mr. DAVIS. If there was not enough business for all systems to live and profit, they would go by the board.

Mr. HARDY. Has not the result of all competitive conditions, or a great many of them, been for the big fish to eat up the little fish?

Mr. DAVIS. Not if the little ones were efficient and could hold up their end. Some small fishes have grown to be very large ones.

Mr. HARDY. Has not that been the tendency in all these powerful, all-pervading combinations?

Mr. DAVIS. When the Government, by granting a patent, guarantees a powerful monopoly, then the little fellow has not much chance until that patent expires, but when it does expire he has just as much chance as anyone else.

Mr. HARDY. But the big fellow, by fighting the patentee and holding him in court until he surrenders, can get the advantage of all these patents, can he not?

Mr. DAVIS. That is not always the case.

Mr. HARDY. But nearly always the case?

Mr. DAVIS. No; these inventors can peddle their patents around to the highest bidder.

Mr. HARDY. Yes; but suppose you have got practically only one bidder. You would have a few companies like this that would maintain some wireless stations, but the vast public would depend upon the 100 per cent monopoly.

Mr. DAVIS. Yes.

Mr. HARDY. You say the public monopoly would destroy progress by destroying competition. Can you give a reason why the Government would be less lenient and encouraging toward inventions than a private monopoly would be?

Mr. DAVIS. The Government is handicapped at times through lack of funds. Congress is not always as liberal to the Government as they have been during this war. And they are bound by laws and regulations, which the companies are not required to observe.

Mr. HARDY. It is your judgment that a private monopoly would be more liberal toward this poor inventor than the Government would?

Mr. DAVIS. It is the record of the past 20 years in this country. They have been more liberal.

Mr. HARDY. Do you think anybody else would agree with you that that is the case?

Mr. DAVIS. I think Prof. Pupin will agree with me.

Mr. HARDY. I think you will find some others here that will not.

Mr. DAVIS. I think Prof. Kennelly will. I think Prof. Armstrong would if he were here.

Mr. HARDY. You remarked a minute ago that nobody was in favor of this bill. Did you hear the gentleman who was here one evening, about the time we adjourned, who said he represented the ship interests, and so on?

Mr. DAVIS. I did; yes.

Mr. HARDY. Did he not speak of quite a number of people in favor of this bill?

Mr. DAVIS. He spoke of three steamship companies, I believe.

Mr. HARDY. Three steamship companies?

Mr. DAVIS. Three steamship companies; yes, sir.

Mr. HARDY. Now, do you know anybody that is opposing this bill except the interests who would be interefered with—the Marconi Co., your company, and possibly some manufacturing companies?

Mr. DAVIS. I know of a number of big steamship companies in New York who are opposed to it; I do not know whether they will come before this committee and oppose it, but I know they are opposed to it.

Mr. HARDY. You heard this man the other day give the names of a number of private institutions that were in favor of it?

Mr. DAVIS. I think I could talk to those private institutions for 15 minutes and convince them they were wrong.

Mr. HARDY. Oh, you mean to say they do not understand?

Mr. DAVIS. They are in favor of it because they do not know what they are in favor of.

Mr. HARDY. I suppose everybody that differs with you does not understand this thing. However, I only want the facts. All I want to know is the exact fact, and I would like to hear somebody that is not interested on either side, instead of charging the Government with being biased and prejudiced—

Mr. DAVIS (interposing). I do not charge our Government with being biased.

Mr. HARDY. You have not done so, but others have.

Mr. DAVIS. I have pointed out that under our system of Government we can not have the same efficiency as in commercial life.

Mr. HARDY. As a member of this committee, what I want to get at is the fact, and the great question that I am concerned with now is this: It looks to me like it has got to be either a private monopoly or a Government monopoly, and if it has got to be one or the other it is a question for us to decide.

Mr. DAVIS. If you say it must come to a monopoly, then why do you have to legislate to make it a monopoly? Why do you want to make it illegal for an American citizen to engage in any legitimate business?

Mr. HARDY. That is a fair question, and I want to state to you frankly that my object is not to promote a monopoly if it can be avoided, but believing private monopoly would result in the absence of legislation of this kind. I prefer, with my present light, a Government monopoly to a private monopoly.

Mr. DAVIS. Along that line, as I have said before, we have had the Food Administration and the Fuel Administration, and they have administered the whole country by regulation.

Mr. HARDY. And I want to get out from under that just as quickly as I can.

Mr. DAVIS. It does not make any difference whether you have a naval monopoly, a post-office monopoly, or a commercial monopoly; they must all be regulated by Congress. You can not let anybody run wild.

Mr. HARDY. Do you think it would be a good idea to take the Post Office Department of this Government out from under the control of the Government and lease it by contract to some great monopoly—would you establish a post office in the hands of private ownership?

Mr. DAVIS. I will say this, that the service of the Post Office Department would probably be improved; that postal employees would probably be better paid; that you would have better post-office buildings; and you would receive more courteous treatment if you had a little competition.

Mr. HARDY. Then, as a matter of fact, you think it has been a great error to establish a Post Office Department?

Mr. DAVIS. I do not say it has been a great error to establish a Post Office Department, but it has been a great error to make it illegal for anybody to engage in that business.

The CHAIRMAN. Do you think it is a great error to provide by law that the Government should have the monopoly of the postal business?

Mr. DAVIS. I think the Postal Service would be improved by having a little competition.

The CHAIRMAN. You do not think we ought to permit competition in the Postal Service?

Mr. DAVIS. I think it would put a little "pep" in the Post Office Department.

Mr. EDMONDS. They certainly need it.

The CHAIRMAN. But monopoly is offensive to you per se, is it not?

Mr. DAVIS. I did not say it is offensive.

The CHAIRMAN. You had something to say about autocracy and Prussianism and all that. Now, what company has a monopoly of the fruit business with Central America?

Mr. DAVIS. No one company has it.

The CHAIRMAN. The United Fruit Co. has, has it not?

Mr. DAVIS. We most certainly have not.

The CHAIRMAN. What competition have you?

Mr. DAVIS. We had before the war—

The CHAIRMAN. No; I mean now—or before the war; that will be fair.

Mr. DAVIS. Before the war we had the Hamburg-American Line, the Atlantic Fruit Co., the Vaccaro Bros. We had a dozen competitors.

The CHAIRMAN. How many vessels of the Hamburg-American Line were engaged in the fruit business between Central America and this country?

Mr. DAVIS. I can not state that offhand, but I can state the competition in terms of imports. The United Fruit Co. imports about one-half the bananas brought into this country.

The CHAIRMAN. That is what I wanted to get at.

Mr. DAVIS. The competitors brought in the other half. We go down in Central America and go out into these forests and jungles, build railroads, put up wireless stations, establish communication, build hospitals and schools, put in sewerage, waterworks, and lighting plants, and bring civilization down there. Then we encourage

the natives and others to go out and open up their banana farms, and we take their products on an annual contract, and when the contracts are about to expire a competitor comes in and bids them up, and we come right along and bid against him. You can not have a more healthy condition of competition than that.

The CHAIRMAN. Are your ships common carriers? Are they open to all those who may wish to engage in the fruit business between Central America and the United States, or are they used exclusively for your own business as far as fruit is concerned?

Mr. DAVIS. We do a general business. If we can not fill up a ship—

The CHAIRMAN (interposing). Do any of your competitors in the fruit business get space on your ships?

Mr. DAVIS. Probably if that ship was coming up empty, or only half full, I do not see any reason why they should not. The high seas are free. Our competitors could provide their own ships. You could hardly expect a farmer to harvest his neighbors' grain and leave his own to rot in the field.

The CHAIRMAN. Well, have they done it?

Mr. DAVIS. I can not recall just now. You must bear in mind, Mr. Chairman, that in order to be successful in this fruit business in Central America you must own your own ships. I don't care whether it is a fruit company or anyone else.

The CHAIRMAN. I only want to develop the facts, so we can draw our own conclusions. Now, take your wireless stations. Is it true or not that they are open to general commercial business between this country and Central America?

Mr. DAVIS. We are; wherever we are permitted to open them to public business they are open to public business, and we do handle public business.

The CHAIRMAN. And where you are not permitted to open them for general public business—

Mr. DAVIS. I will go into that later, in executive session.

The CHAIRMAN. If you do not care to mention it now, very well.

Mr. DAVIS. There are certain conditions surrounding it that I do not feel like stating in an open hearing.

The CHAIRMAN. But your ships and wireless stations are a part of your plant, or your business, in developing the fruit trade between Central America and the United States?

Mr. DAVIS. Not fruit trade particularly; in developing American commerce.

The CHAIRMAN. Well, the fruit business is the particular business in which you are engaged?

Mr. DAVIS. It happens to be the biggest business, the biggest part of the business.

The CHAIRMAN. What other business are you engaged in besides the fruit business?

Mr. DAVIS. Sugar, general freight business, the development of railroads in Central America and South America, the development of Central American business in general. We look into all of their resources there and develop them and put them on their feet and bring their products into the United States.

Mr. ROWE. And carry our products there too?

Mr. DAVIS. And we carry American products into Central America, thousands of tons.

Mr. ROWE. How many stations have you down in the Gulf of Mexico and Caribbean Sea?

Mr. DAVIS. Nine.

Mr. ROWE. And do you do a general commercial business with these wireless stations?

Mr. DAVIS. As I say, wherever it has been permitted, wherever we have not been blocked through some governmental agency, we have done it.

Mr. ROWE. Do you do a ship-to-shore business with all the ships in that neighborhood?

Mr. DAVIS. We take care of all ships in the Caribbean Sea. Our wireless is free to all of them.

Mr. ROWE. Even your opponents?

Mr. DAVIS. Even our opponents. We handle our competitors' messages just the same as if they were our own. In fact, I might add that we encourage our competitors to send their messages by our system.

Mr. ROWE. And you must have a station in the United States in order to get into communication with your offices in the different cities of the United States; is not that necessary?

Mr. DAVIS. It is absolutely necessary.

Mr. ROWE. Is that the main reason for maintaining a station at New Orleans?

Mr. DAVIS. That is the sole reason for maintaining a station at New Orleans.

Mr. ROWE. Through that station then you are able to report to your New York office and other offices the movement of your ships?

Mr. DAVIS. Yes, sir.

Mr. ROWE. Does the commercial part of your wireless business pay?

Mr. DAVIS. It has been remunerative; yes, sir; excepting messages from passengers on ships. And at a rate which was less than the cable rate between the United States and Central America we have built up a very nice wireless business, in addition to handling our own business.

Mr. ROWE. You have not told the committee this time about the difficulties that you experience where your stations have been established in the ship-to-shore business, about the currents and so on—about the static.

Mr. DAVIS. Well, two years have gone by. We have not overcome static yet. We still have it, but we are doing better than we did two years ago—much better.

Mr. ROWE. Is it more difficult to handle messages there than it is along the northern Atlantic coast?

Mr. DAVIS. Much more difficult. The belt lying between the Tropic of Cancer and the Equator is a very difficult one for wireless to bridge on account of this static.

Mr. EDMONDS I am sorry my friend from Texas has left the room. He seems to be obsessed with the idea that there is going to be a 100 per cent monopoly in wireless. That might be true with respect to the high-power stations, might it not?

Mr. DAVIS. As long as the Marconi Co. gives the best service in the world and the cheapest service in the world, perhaps it might.

Mr. EDMONDS. But would it be true in ordinary commercial business? If the Delaware & Lackawanna Railroad wanted to establish wireless along their lines, would the Marconi Co. monopolize that?

Mr. DAVIS. They could not.

Mr. EDMONDS. Do they monopolize the Wanamaker establishment in Philadelphia?

Mr. DAVIS. Not that I know of. I do not know that they use it.

Mr. EDMONDS. If these cotton factories that Judge Saunders was speaking about should put up wireless, could they monopolize that?

Mr. DAVIS. They could not.

Mr. EDMONDS. Have they monopolized you?

Mr. DAVIS. No, sir.

Mr. EDMONDS. There is no such thing as a monopoly in wireless, and no possibility of it?

Mr. DAVIS. There is no possibility of a monopoly in radio unless you legislate to make it a monopoly. The only monopoly that can exist in radio is by virtue of this bill and our patent law. We all want the patentee or inventor to get all that is coming to him. He has the monopoly for 17 years; that is the law. After 17 years anybody can go out and engage in it, but if you pass this bill they can not.

Mr. EDMONDS. No; it is just going to tie it up and make a monopoly?

Mr. DAVIS. Make a monopoly; yes, sir.

Mr. EDMONDS. But most of these patents are running out now?

Mr. DAVIS. They expire in a very short time.

Mr. EDMONDS. And it is going to be a case of service entirely?

Mr. DAVIS. Service will always be the governing factor in any business; yes.

Mr. EDMONDS. Therefore, my friend's fear of the 100 per cent monopoly that Mr. Nally hoped for, but probably did not see himself when he spoke of it, is absolutely impossible?

Mr. DAVIS. Absolutely.

The CHAIRMAN. That might be true if it were not for the fact that there are monopolies in control without patents.

Mr. DAVIS. Then they are monopolies by virtue of superior service.

The CHAIRMAN. By power of money and combination, by which they can suppress competition. If you do not know of that, you are not informed.

Mr. EDMONDS. The gentleman from Texas spoke of Mr. Schwab. He is the greatest trust buster in the country; he has established the greatest opposition to the biggest trust in the country—the United States Steel Corporation.

The CHAIRMAN. When?

Mr. EDMONDS. Why, the Bethlehem Steel Co. is the greatest opposition the United States Steel Corporation has.

The CHAIRMAN. That is all a joke. [Laughter.] You can not tell that to an intelligent audience. I am sorry we can not get the gentleman's smile in the record to show that he does not believe it himself.

Mr. GREENE. I would like to ask this gentleman a question, although I do not know that it relates to this particular controversy.

The United Fruit Co. had all its ships built in foreign countries. They did not have any built in America?

Mr. DAVIS. All of the present ships were built abroad; yes, sir.

Mr. GREENE. And had foreign officers on them?

Mr. DAVIS. Up to the time of the President's proclamation.

Mr. GREENE. Now, let us understand very plainly why you did that; why you did not come under the American flag and American regulations.

Mr. DAVIS. We came under them just as soon as we were permitted to do so.

Mr. GREENE. I know you undertook to come in earlier.

Mr. DAVIS. We made several attempts.

Mr. GREENE. I tried to prevent you from doing so, because I thought it was unjust, after having built your vessels abroad. Mr. Humphrey, of Washington, who was a very strong man on this committee, favored it, but this committee decided not to let you do it. The point that I am making is that you could build your vessels cheaper abroad than you could build them here. You could employ men on them under better regulations as long as they were under a foreign flag than you could under the American flag.

Mr. DAVIS. You must understand this, that in developing this Central American and South American trade, in which we were the pioneers, we were in competition with England, Germany, and Norway; we had to have ships and men who could compete. We could not have entered that business and competed with those countries and developed our business as we have if we had been under the American flag.

Mr. GREENE. That is it. Now, in developing a great merchant marine, which we talked so much about, we have spent enormous sums; we have put them under so many regulations and bound them up so tight that when we undertake to go out and capture the world's trade we have got to do something or other to get a chance to capture it. We are not going to capture it by wind or by whistling in this committee. We have to provide something to meet the difference between the cost of vessels abroad and the cost of manning the vessels abroad and in this country; we have got to go against Japanese competition and every other kind of competition. We have got to find some kind of method to meet that competition after spending this vast sum of \$4,000,000,000, enough to build 10 Panama Canals. We have spent or appropriated for the Shipping Board \$4,000,000,000 in money, and where are we going to be when we undertake to go out and meet that situation?

Mr. BANKHEAD. Do I understand that to be intended as a question?

Mr. GREENE. Yes; that is a question. I would like to know where we are going to be when we go out to meet that situation.

Mr. DAVIS. We are not going to be any place if we have legislation such as this, which is going to put a damper on our efforts and is going to wreck of first-line trenches—our means of communication. We can not go out and compete if you are going to do that.

Mr. GREENE. And this is an additional handicap on American enterprise?

Mr. DAVIS. It is one of the most serious handicaps, not to be able to have your medium of communication in such shape that you can regulate it.

Mr. GREENE. It is going to be another serious handicap added to the many handicaps that you find in competing for foreign trade, which we claim we are trying to foster. That is what I wanted to get after. I am correct in that, am I?

Mr. DAVIS. You are correct; yes, sir. It is going to be a very serious handicap to that development.

The CHAIRMAN. Mr. Davis, the United Fruit vessels were admitted to American registry under the ship registry act of August 8, 1914, were they not?

Mr. DAVIS. I believe that is correct; yes, sir.

The CHAIRMAN. That was a bill I introduced, which passed the House under a suspension of the rules, and for which I think my friend from Massachusetts voted.

Mr. GREENE. Oh, yes; in time of war, or prospective war; I foresaw war myself in 1914. I voted for a great many things after the war broke out in Europe.

The CHAIRMAN. That was the war in Europe. We were not in then.

Mr. GREENE. I understand that, but we ought to have been in it very early.

The CHAIRMAN. I know we ought to have been in it from the beginning, but that is aside from this question.

Mr. GREENE. I foresaw that trouble was coming, and I voted for a great many things that I would not have voted for under ordinary circumstances. I said so on the floor and I say so now. I voted in the line of patriotism.

The CHAIRMAN. I just thought you had forgotten that matter. [Laughter.]

Mr. GREENE. Not a bit. I take bitter medicine sometimes; and although I never took a glass of whisky in my life, if I needed it to preserve my life I would take it.

Mr. DAVIS. I have finished, Mr. Chairman.

Mr. NALLY. Mr. Chairman, may I correct one mistake? Mr. Davis said the Marconi Co. had entered into a contract with the Navy not to build any more coast stations. That is a mistake; we did not enter into such a contract. We did, naturally, agree not to build stations that would interfere with the stations we had just sold; I think it would be unethical to do otherwise; but we are still free to build stations.

Mr. DAVIS. I beg your pardon, Mr. Nally; I am glad to have my remarks in that regard amended. But there is this to be said: Mr. Nally's system covers nearly the entire coast, and if they are not going to erect stations which would compete for the business which would ordinarily go through these stations under control of the Navy, it follows they have, as a practical matter, made an agreement not to build any more coast stations.

(The committee thereupon proceeded, in executive session, to hear the statement of Mr. Walter S. Penfield, and at 1 o'clock p. m. took a recess until 2 o'clock p. m.)

AFTER RECESS.

The committee reassembled at the expiration of the recess.

STATEMENT OF MR. SAMUEL E. DARBY, NEW YORK CITY, REPRESENTING THE DE FOREST RADIO TELEPHONE & TELEGRAPH CO., OF NEW YORK.

Mr. DARBY. Mr. Chairman and gentlemen of the committee, my name is Samuel E. Darby, of New York. For the past 25 years I have been actively and continuously engaged in the practice of patent law. Prior to entering that profession I was for six or seven years an assistant examiner in the United States Patent Office. I am here to represent the De Forest Radio Telephone & Telegraph Co., of New York.

That company does not own nor operate radio stations; it is not interested or engaged in the commercial work of sending or receiving messages. It is a manufacturer of radio apparatus and confines itself exclusively to the manufacture and sale of radio apparatus under patents which it owns and has developed.

The company owns 265 patents and applications for patents. Of that number 100 have been contributed by the inventions of Dr. Lee De Forest. I regret exceedingly that Dr. De Forest is unable to present his views in connection with this matter. He is at present in Europe in connection with radio matters and therefore the responsibility of representing to a small extent the interests of that company devolves upon me.

Dr. De Forest, I may say, is one of the pioneer American inventors in the radio art, and in his absence I might perhaps say that he began his researches into the radio art while a student at Yale University. He continued his research and study of the art as a student of Armour Institute of Chicago, and it was while he was a student at Armour Institute in 1900 that he made his first invention in the radio art.

He has continued from that time to the present devoting his entire time and energy and genius to the advancement and to the improvement of the radio art, and, as I have said, has applied for and procured 100 patents for inventions which he made—many of them he has constructed and installed with his own hands.

I do not believe I can be challenged when I say that there is no man in this country, no American, who has done more in the practical work of developing the radio art than has Dr. Lee De Forest. For his achievements he enjoys the honorary degree of doctor.

The De Forest apparatus, especially, the audion detector and amplifier which has been referred to particularly in these hearings, is now standard wireless equipment in our own Navy as well as in the principal navies of the world. I might say, further, that it was the De Forest audion amplifier which made possible transoceanic radio communication. The audion amplifier has also made possible trans-continental-wire telephony. The American Telegraph & Telephone Co. is operating to-day under a license under the De Forest patents.

I think, Mr. Chairman, that it has been made perfectly clear in these hearings that if this bill is enacted into law it will mean Government monopoly of the entire radio art. I think it has been

made equally clear that if this bill is not enacted into law it will mean Marconi monopoly of the radio art. Mr. Nally has told us that the Marconi Co. to-day controls 90 per cent of the business, and they hope to make that practically 100 per cent.

Mr. NALLY. Ship-to-shore business.

Mr. DARBY. Therefore I say that the manufacturer, the little fellow who is engaged solely in the manufacture and supply and sale of radio apparatus, is confronted with the two horns of a dilemma. On the one hand he is confronted with the possibility of being hoisted on the horn of Marconi monopoly, and on the other hand, the horn of Government monopoly of this art. It is a question which is confronting the De Forest Co., and, as I conceive it, every company engaged, as it is, in a modest way in trying to live and to manufacture. The condition they are confronting to-day is whether they can survive the monopoly of the Marconi Co. on the one hand or survive the monopoly of the Government on the other hand.

For my part, speaking in behalf of the De Forest Co., I am free to say, notwithstanding the fact that it is between the devil of private monopoly on the one hand and the deep sea of the Navy on the other, that if the choice is left to my advice, we will accept the Government monopoly every time. I will explain the reason for that.

We have been told of some of the devices to which private monopoly will resort in maintaining its monopoly. They tell us of their scheme of lease contracts for their apparatus. The Marconi Co., if this bill is not enacted, will control the shore stations—and there must be shore stations or else there can be no radio apparatus or use made of it. The Marconi Co. manufactures its own apparatus. It leases its apparatus; it does not sell it.

If I recall it correctly, as to the figures given on lease prices, Mr. Humphreys of this committee figured out that it was a losing proposition to the Marconi Co. to lease their apparatus at \$1,000 a year with an average life of five years instead of selling it outright at \$3,300 per set. Nevertheless, the Marconi Co. tell us they find it more profitable to lease than to sell their apparatus outright. They must have a very good and very substantial reason, and that reason we find, of course, in private profit.

But it is not merely the leasing of this apparatus that concerns the Marconi Co. in its monopoly, but under the guise of a lease of property under patent rights they are endeavoring to extend and expand the scope of those rights, apparently secured by patents, but going far beyond the limits or the bounds of proper beneficent patent monopoly and ownership.

Under the lease system, for example, they tell us that they also insist upon having their own operators employed. They tell us they insist upon supplying their own repair parts, their own extras, articles that are not covered by patents, which ought to be open to the manufacturers of the country to supply.

It is such practices as the lease contract system that have brought the United Shoe Machinery Co., for example, into disrepute and made it an object of attack by the Government, because they sought to control not only their patent properties but also devices and apparatus which were not covered by their patents, under the guise of patent protection.

In the same way the Dick Co. attempted, under the guise of patent protection for their neostyle or duplicator, to control the sale of ink, paper, and other common commodities which anyone could supply and should have an opportunity to supply.

It was under that same system of extension of patent rights that the Victor Talking Machine Co. attempted to control the manufacture and sale of the record disks for use with their patented apparatus. Under that same guise the Victor Talking Machine Co. attempted to control the resale price of their patented machines, until they were stopped by the Supreme Court.

That is one of the devices. Mr. Chairman, that is resorted to in the case of private monopoly and is being resorted to in the case of the Marconi monopoly.

I speak rather feelingly on this, because the De Forest Co. has been made a victim of the methods of the Marconi Co. There has been practically continuous litigation with the Marconi Co. on patent rights, and the Marconi Co. has not hesitated to attempt to take away from the factory of the De Forest Co. and to prostitute them, their skilled employees. That is another device of private, obnoxious monopoly, not included within the beneficent monopoly of patent protection.

They have oppressed not only the De Forest Co. but other companies, other individuals, who have dared to undertake to manufacture and sell wireless apparatus of any kind. Whether it was an infringing apparatus or not, under the guise of patent protection, they have attempted to suppress it and to maintain their grasp and control on this radio art.

Judge Hardy remarked the other day that there were a thousand and one ways in which a rich and powerful corporation could grind down opposition or competition. Whether the Marconi Co. has overlooked any of those I do not know [laughter], but I do know that they have exerted every influence that was possible to run the De Forest Co. out of business. And it has been in the face of such tremendous difficulties as that that the De Forest Co. has been able to continue in business and has supplied its absolutely necessary apparatus for the use of our Government and other governments in this audion detector and amplifier, and other devices.

Therefore, I say that if the choice is left as between the private monopoly of the Marconi Co. on the one hand and the Government monopoly on the other, there is no question where the interest—the material, substantial interest—of manufacturers lies. It is with the Government and in favor of this proposed bill.

But let us examine the other side. There is another side; that is the side of Navy control or Government control. Prior to 1910, whenever the Government saw fit to use a patented device or apparatus without the license or consent of the patent owner, there was no redress for the patent owner. That was true, because patent infringement is a tort, and the Government had never consented to be sued in tort. There was one way in which a patent owner could, prior to 1910, enforce his rights against the Government under his patent, and that was where a contract, either express or implied, between the patent owner and the Government had been violated. On the strength of that violation of a contract the patent owner had a

right to go into the Court of Claims and sue the Government for its appropriation.

The Congress recognized the injustice of that situation and enacted the law of June 25, 1910, which is entitled "An act to further extend the protection afforded to patent owners of the United States." Under its provisions, whenever the Government used a patented invention without the license of the patent owner, he had the right of action in the Court of Claims for that infringing use.

That, however, limited the right of action against the Government to the use of the invention. A patent secures to the patentee not only the exclusive right to the use of the invention but also the exclusive right to make and to sell the patented apparatus. It was thought by many in the profession and some of the courts, as I will show, that the act of June 25, 1910, carried with it an implied license in the Government to use any patented invention: and having the lawful right as an implied licensee under any patent, subject of course to recourse to the Court of Claims for the infringement, it was not, of course, incumbent upon the Government to manufacture by its employees in its own shops the patented apparatus it wanted to use. Being an implied licensee, it had the right to employ anyone else outside the Government to supply or make the apparatus for it.

A case arose in the southern district of New York, and, by a curious coincidence, it was a case involving radio apparatus. Still further, curiously, we find the Marconi Co. complainant in that action. The case that arose was that of Mr. Simon, who contracted with the Navy Department to build certain wireless apparatus for the Navy Department. The department prepared the specifications, what it wanted, and called upon Mr. Simon to construct that apparatus for it. The Marconi Co. sued Mr. Simon, with a view to collecting from him the profits that he might make in filling that contract, and, in addition, sought to enjoin Mr. Simon from making that apparatus or other apparatus, saying that they had patent rights covering that apparatus.

The defense in that action was that Mr. Simon was merely acting as an agent for the Government. The Government had prepared the specifications and plans for the apparatus it wanted to use and had employed Mr. Simon to construct that apparatus. The United States District Court for the Southern District of New York accepted that view of it, and said that under the act of 1910 the remedy was a suit against the Government for the use of the apparatus, and as the Government was an implied licensee it had the right to have the apparatus made for it by whomsoever it pleased. On appeal to the Court of Appeals for the Second District the decision of the lower court was affirmed. The case was then carried to the Supreme Court.

Meanwhile the Cramp Shipbuilding Co. undertook to build some destroyers for the Navy under specifications drawn up by the Navy Department and to install on those destroyers certain turbine engines. Those engines were claimed by the Curtis Turbine Co. to infringe its patents. A suit was brought by the turbine company against the Cramp company. As a result of that litigation, the turbine patents were sustained as valid, and the turbines installed in these destroyers were held to infringe.

The matter was referred to a special master to take an account of the profits made by the Cramp company in filling that order. At the

hearing before the master it was attempted to exclude certain of those destroyers from the accounting proceedings on the ground that the contract for their construction was not made or entered into until after the act of 1910. Practically the same defense was made there, that the Government was an implied licensee under the act of 1910 and had a right to have the Cramp company supply these engines for it. The master refused to accept that view.

The matter was taken to the District Court for the Eastern District of Pennsylvania, and the master was overruled on the authority of the Simon case.

The matter was then taken to the Circuit Court of Appeals for the Third Circuit, and that court, learning that the Simon case was in the Supreme Court, deferred a decision on the point, and for the sake of the record affirmed the district court. Whereupon the Cramp case was taken to the Supreme Court. Those two cases were heard and decided to gether. They are reported in 246 U. S., page 28 and page 48.

The Supreme Court held in those cases that the act of 1910 did not give to the Government the right to have apparatus made for it by outside parties without the outside parties accounting to the patent owners for the profits made in building that apparatus, thereby in effect reversing the Circuit Court of Appeals for the Second Circuit and the District Court for the Eastern District of Pennsylvania.

Mr. HUMPHREYS. May I interrupt you there? Did the court hold that the outside manufacturer could manufacture it?

Mr. DARBY. Could not manufacture it.

Mr. HUMPHREYS. You said they could not manufacture it without accounting for the profits they made?

Mr. DARBY. Yes.

Mr. HUMPHREYS. Was that the measure of damages, the profits that the outside manufacturer made?

Mr. DARBY. That was the measure of damages; yes, sir. It is usually the measure of damages in patent infringement litigation.

Mr. HUMPHREYS. If the outside manufacturer sells it at a very much smaller profit than the patentee would is the rule still the same?

Mr. DARBY. The only measure of damages is the profit he made. But that is a very small part of the substantial benefits obtained by the litigation. The most important part was the injunction restraining them from carrying on the infringement, and the Supreme Court held in effect that there was a right of injunction against the contractors, the Cramp Co., in the one case, and Mr. Simon in the other, except that in the Simon case another question came in involving what is known as contributory infringement, which was practically the turning point in the Simon case in the Supreme Court.

With that situation the war came on. Then it became necessary for the Government to acquire large quantities of apparatus to enable it to successfully prosecute the war in all directions, not alone in radio but in other arts, in the automobile art, in the aircraft art, in the motor construction art—in all directions the Government required enormous quantities of materials and apparatus and devices of all kinds.

In the contracts made—and this has been the practice, I understand, for a good many years; it was referred to, I think, by Commander Hooper—in the contracts made by the Government with the manufacturers a clause was inserted requiring the manufacturer to hold the Government harmless from patent infringement litigation. With the large quantities of apparatus required by the Government for the war it was impossible for the patent owners themselves to supply that apparatus to meet all the requirements of the Government; they had to get other manufacturers here, there, and everywhere to make and supply the necessary apparatus for the war. But these outside manufacturers were confronted with this situation created by the decisions of the Supreme Court, that in case they did manufacture for the Government patented apparatus they were liable to be sued for the profits they made on that manufacture, and in addition to pay the costs of that litigation; with the further addition—which is statutory—that the trial court in a patent infringement litigation has the authority and power to increase damages threefold.

Whereupon the manufacturers of the country were confronted with that situation, and they hesitated as between their patriotic duty on the one hand to supply everything that was necessary for the Government to carry on the war and absolute ruin on the other if they had to account for the profits they made on the apparatus they constructed for the Government.

It was under that exigency that appeal was made to the Government. It was made in the case of the De Forest Co., because when the war was declared the De Forest Co. placed its staff at the disposal of the Government; it was operated for 24 hours a day, night and day continuously, to the highest tension and strain, to supply apparatus to the Government and only to the Government during that period.

It was necessary for those who were operating under those contracts to apply to the heads of the departments with which they were doing business for relief, and the departments were not slow to grant that relief. In some individual cases the indemnity clause in the contracts was canceled. In other individual cases—and that was the experience of the De Forest Co.—the Navy Department assumed sole responsibility for any infringement action that might be instituted. That enabled the Government to get the apparatus that it needed.

Then, in the act making appropriations for the Navy for the year 1910, ending June 30 next, the act of 1910 was amended. The purport of that amendment was that whenever the Government used a patented invention without the license or consent of the patent owner, or whenever such apparatus was manufactured by the Government or manufactured for the Government, then the entire remedy, the entire compensation, was to be recoverable by action against the Government in the Court of Claims.

You will note the expansion of the act of 1910. The act of 1910 applied only to the use by the Government. This amendment, which is now the law of the land, increased that so as to apply to apparatus made by the Government or made for the Government. That is the law under which we are operating now, so that to-day, whether this bill passes or not, if the Government wants to use any patented

apparatus it can do so and have it made for it by whomsoever it pleases, and it will assume the full burden through action in the Court of Claims for infringement.

Now, if this bill passes and becomes a law the manufacturers of the country are confronted with that situation. It is entirely possible for the Navy Department then to have made for it any apparatus, without regard to the patent ownership of anyone, leaving the patent owner to his recourse by suit in the Court of Claims. And that, I assure you, Mr. Chairman, as the result of my own personal and professional experience in that court, is but a shadow of right.

MR. HUMPHREYS. Could the patentee in such circumstances as you have related go into the court to secure an injunction against the manufacturer who had contracted with the Navy?

MR. DARBY. No, sir; not under the amendment to the act of 1910.

MR. HUMPHREYS. He can continue manufacturing?

MR. DARBY. Yes, sir.

MR. HUMPHREYS. Let me ask you this further question. See if I get this right. Suppose there is some apparatus the Navy wants; for instance, one of these receiver sets. There are various parts of that, I assume, that have been patented at different times; A will have one patent, B another, and C another. Suppose the Navy, preferring one or the other of those parts, would provide in their contract that this receiving set shall have this particular part in it, and the manufacturer agrees to make the whole thing, including that part. He makes the complete receiver at a reasonable profit, including in that the cost of this patented item, which he puts in at actual cost. What becomes of the patentee then and his rights? There has been no profit made on that.

MR. DARBY. The courts have passed on that question in this way. If the profits made on a patented feature of an entire structure can be segregated from the profits made on the construction of the entire article, then those profits will measure.

MR. HUMPHREYS. Suppose there was no profit?

MR. DARBY. If there was no profit then the measure of damages would be what profit the patent owner would have made if he had supplied it. Those are well established principles of the patent law which govern, and fairly equitably, recovery for patent infringement.

So I say, Mr. Chairman and gentlemen, that if this bill goes into effect the small manufacturer will be liable to have the Navy Department manufacture any apparatus it pleases, leaving only the right of suit in the Court of Claims to recover for that infringement. But there has never been within the range of my experience—and I speak also for the De Forest Radio Co.—any disposition on the part of the Navy Department not to recognize fairly and equitably the rights of patent owners. I say that advisedly, because I have been thrown in contact with them professionally for several years. There has never been any disposition, so far as it has come under my observation, for the Navy officials and naval officers not to deal fairly with patent owners. There was never any disposition to arbitrarily take a man's invention without giving him an opportunity. I do not believe that, if given the authority they ask under this bill, that would develop any serious obstacle.

MR. HUMPHREYS. You mean the opportunity to make it himself?

Mr. DARBY. Yes. I do not think that the Navy Department contemplates manufacturing or is as well equipped to manufacture the apparatus as are those who have been engaged in manufacturing that apparatus from the beginning. I think they realize that and recognize it, and therefore they go out in the market and purchase it.

On the other hand, that is a difficulty that the manufacturers confront, and it as a very serious situation. It affects them profoundly. If the Navy Department has the right to have patented apparatus made for it by whomsoever it pleases without regard to patent owners, then it is going unquestionably to work a tremendous hardship on the little manufacturer.

A suggestion was made to this committee that a board has been appointed in the department to handle this patent situation, and that they are at work on it. My suggestion would be to give such a board as that statutory authority. Write such a board as that, or the one suggested by Mr. Nally, into this bill; make it an authoritative board, with power enough to straighten out matters affecting patent rights and patent owners, and giving it other powers—powers such as suggested by Mr. Nally, for example, of determining the practical working wave lengths under which this apparatus might be operated, whether by the amateur, the ship-to-coast stations, or the high-power stations. That would be my practical suggestion.

But one thing is certain: If the Government should take over this radio business and it becomes a Government monopoly—just as it has, for example, taken over the patents of the Poulsen system and the Federal Telegraph Co.—the Government would not be interested in enforcing any of its patent rights against any manufacturers throughout the country and the manufacturers then would spring up, in my judgment, all over the country, manufacturing this patented apparatus, because the Government would control the patents and the Government then would get the benefit of the very best apparatus, because it would be a case of the survival of the fittest. A keen business competition would arise among the manufacturers to supply the best quality of apparatus, and that is what the Government wants.

Now, as to the development, the future development of the art, whether it shall be through private monopoly, or I should say Marconi monopoly, or Government monopoly, I think it is beyond question that there would be greater progress made and greater advancement in this wonderful art if the Government had control than there would be if the Marconi Co. had control. I base that statement on this fact: Notwithstanding the fact that the De Forest audion detector and amplifier is standard equipment and the most important and up-to-date equipment for the receiving apparatus, the Marconi Co. has never adopted or used it except by infringement. It had the right to go to the De Forest Co. and purchase it, but it did not do so. Instead, it was not slow to undertake to manufacture it for itself in defiance of the De Forest patents, and would be manufacturing and using it to-day if it were not for an injunction. The De Forest Co. had to bring suit to enforce its rights.

And there is one point I would like to answer, suggested by ex-Attorney General Griggs. He told this committee, as illustrative of the attitude, as he expressed it, as I recall, of the Navy Department toward the Marconi Co.—and there were almost tears in his voice;

he was certainly trembling with suppressed emotion or virtuous indignation when he said it—that even the Navy Department attempted to interfere with litigation which the Marconi Co. was carrying on against infringers and referred to a case out in California.

I do not know anything about that, but I do know about the case he mentioned of the De Forest Co. It is true that there was litigation pending between the Marconi Co. and the De Forest Co. at the time we entered the war. When we entered the war the De Forest Co., as I say, started in immediately to devote its entire time, night and day, to the manufacture of apparatus for the Government, for the Government's use, for the successful prosecution of the war, working under high tension; and yet the Marconi Co. was attempting during the period of the war to suppress the De Forest Co., to press that litigation, by taking away from the supervision of the manufacturing end of it the experts—Dr. De Forest and his staff of engineers—who were absolutely necessary as witnesses in that litigation.

We either had to embarrass the Government by failing to supply it with the necessary apparatus that it required, or else let the litigation go by default. Under those circumstances, and in behalf of the De Forest Co., I appealed to the Navy Department for assistance, for pressure to be brought to hold back the Marconi Co. from pressing that litigation. So when Mr. Griggs complains that that was illustrative of the attitude of the Navy Department he is unjust. If there is any fault to be found he can find it with me, at least to that extent.

And within the past two weeks, while the signatures to the armistice are hardly dry, the Marconi Co.'s attorneys have gone into court there in New York and reinstated that litigation, which had been suspended for the duration of the war. And notwithstanding the fact they knew that Dr. De Forest was out of the country and absolutely necessary to the defense of the suit, they pressed the court for an immediate trial of that case. That, I submit, is another one of the thousand and one ways that a rich and powerful corporation can use that power under the guise of patent protection, to embarrass, to harass, and to discourage commercial business enterprises. I should think that, instead of being virtuously indignant at the Navy Department, the Marconi Co. should hang its head in shame to confess that when the Government needed this apparatus it was engaged in embarrassing the Government in getting it.

I have one further practical suggestion to make, Mr. Chairman. As I have said, in view of the fact that these small manufacturers are confronted with the prospect of being hoisted on the horn of the dilemma of Government monopoly or crucified on the horn of the Marconi monopoly I think it would be necessary to protect the interests of those manufacturers like the De Forest Co. and others situated like them. Their whole business is devoted to the manufacture of this apparatus. They would have only one purchaser for their apparatus in either case whether it was the Government or the Marconi Co. Therefore other enterprises should be included in this bill under the definition that is given of radio stations. When I first read the bill I thought that was its purpose. The term "radio station" means "any place, vessel, or vehicle containing

apparatus used or capable of being used for transmitting or receiving signals." A place where apparatus is manufactured and tested out is certainly a place containing apparatus used or capable of being used for radio purposes. When I read that definition of a radio station I gained the distinct impression that it included also manufacturers. At this hearing, however, as I understand, Capt. Todd stated most emphatically that that was not the purpose nor the intent of the bill. My suggestion, therefore, is to include in the definition of a radio station "also any factory or business enterprise engaged exclusively in the manufacture of such apparatus."

Then, in section 8, I think it is——

Mr. HUMPHREYS. Would you suggest that as an addition?

Mr. DARBY. As an addition, just write that on after the word "signals," in line 9.

Mr. HUMPHREYS. Will you again read your suggestion?

Mr. DARBY. "And any factory or business enterprise engaged exclusively in such enterprise."

Mr. HARDY. Would you not be in the position of nullifying your amendment by the use of the word "exclusive"? Because any other little business would prevent it being used.

Mr. DARBY. I had in mind this, if the chairman please: The General Electric Co., for example, is engaged in making radio apparatus for the Government, but it is not engaged exclusively in making radio apparatus, and there would certainly be no object to the Government taking over the entire General Electric Co. just because of the small side issue it has of radio. That is why I suggest that word "exclusively"—engaged exclusively in the manufacture.

Mr. HARDY. It occurs to me that if a factory wanted to be taken they would have nothing else to manufacture, and if they did not want to be taken they would put in a little something else.

Mr. DARBY. That would mean that the business enterprise, so far as it related to wireless, would be taken over, and it would leave the individuals free to embark in some other business enterprise, but they would be taken over and would be compensated as to part of the property referred to in this section 8 of the bill.

I wanted to say, Mr. Chairman and gentlemen——

Mr. HUMPHREYS. Your idea is that in the event the bill became a law it would embark the Navy Department not only in the operation of radio communication but also in the manufacture of all apparatus necessary.

Mr. DARBY. That would probably result if the Navy, after taking it over, cared to carry on that manufacturing operation. But what I had in mind was not so much the Navy Department, as they are to take care of the present manufacturer, who would be at the mercy of monopoly.

Mr. HUMPHREYS. But the bill says that the President shall requisition and take permanent possession of radio stations.

Mr. DARBY. I do not know that that would be such a bad thing for the Navy Department, because thereby it would acquire properties which have been built up and improved for manufacturing the very apparatus that they wanted to use. They would be getting the apparatus and equipment for doing that. I do not think that it would be the policy of the department to engage in manufacture, but

at least they would have the facilities for doing it, and they could lease the factory part of it out, and the machinery part out, and employ others to make it for them.

Mr. HUMPHREYS. It would prevent anybody else in the country engaging in that enterprise?

Mr. DARBY. No; I do not think so.

Mr. HUMPHREYS. But if he engages in the enterprise of manufacturing radio apparatus he immediately becomes a radio station, and thereupon is taken over at once by the Government?

Mr. DARBY. Perhaps it might be further improved by saying "any established business devoted exclusively to the manufacture of wireless."

Mr. HUMPHREYS. I do not know what that would mean. Is there a legal definition of "established business"?

Mr. DARBY. I think so. I think the legal definition of that is one that has already been created and built up.

Mr. HUMPHREYS. Then, as soon as a man undertook to establish a manufacturing plant for the manufacture of some radio apparatus, he would be permitted to go on until he got his plant completed; then he would have, under the terms of this bill, to turn it over to the Government?

Mr. DARBY. They would have the merit certainly of encouraging manufacture. [Laughter.]

Mr. HUMPHREYS. I am not discussing the "merit" of it; I am just discussing the terms of the bill. That would be the effect of it?

Mr. DARBY. That would probably be the effect of it.

Mr. HUMPHREYS. If we discuss the merits of it, it might be suggested it would encourage the establishment of manufacturing enterprise, but you would have a market then that you would not have to quibble about. The law says whenever anybody establishes this enterprise the President shall buy it.

Mr. DARBY. In any event, the manufacturers are confronted, as they are to-day, with that absolute condition.

Mr. HUMPHREYS. Nobody under those circumstances would ever engage in that business with the expectation of carrying it on.

Mr. DARBY. Probably not.

Mr. HUMPHREYS. Well, certainly not?

Mr. DARBY. Probably not; yes.

Mr. HUMPHREYS. He would engage in that enterprise solely for the purpose of transferring it to the Government as soon as the key was handed over to him by the contractor?

Mr. DARBY. That is the suggestion I make; it might be entirely untimely.

What I was principally interested in was some method or some expression that can be used in this bill which would prevent striking down and destroying existing business enterprises. In the case of the De Forest Co., in acquiring its 265 patents and the improvements which they mark in the art it has cost thousands of dollars and a tremendous amount of time and ingenuity in experimentation, and that is the most costly part of any business enterprise. It has cost a tremendous amount, and yet under the authority of the statutes as they stand to-day the act of 1910 and the amendment in the Navy appropriation bill, the Government has the right to have any of De Forest's patented apparatus manufactured for it by the Marconi Co.

without any other recourse to the De Forest Co. except the right it has in the Court of Claims.

Mr. HUMPHREYS. That is what the Navy believes in.

Mr. ROWE. Is not that the reverse of what has happened; that is, have not the De Forest people manufactured apparatus covered by other peoples' patents for the Government?

Mr. DARBY. It has, certainly, during the war; we freely admit that.

Mr. ROWE. Well, before the war.

Mr. DARBY. Before the war it manufactured under its own patents, which the other companies have contended interfered with their patents—yes; just as the Marconi Co. had the De Forest patents.

Mr. ROWE. If this line of procedure be carried out that you suggest, I should think it would be perfectly fair on the part of the Government, if they wanted any of the De Forest apparatus, to get somebody else to make it for them.

Mr. DARBY. Surely; that is the law as it stands to-day. The Government has that right to-day, to have any De Forest apparatus made for it by anybody else, and the only recourse is in the Court of Claims, and that, I say, is not satisfactory, because of the difficulties—and these are serious difficulties, when you get into the Court of Claims—difficulties of getting evidence: and, besides, the Court of Claims has only power or authority to make findings of fact and draw conclusions of law. The Court of Claims has no equity jurisdiction, and if there is any part of jurisprudence that is more important to the interests of patent owners it is the equity jurisdiction of the courts. The Court of Claims has no right to enjoin, and I doubt very much even if it had the right it would exercise it.

Mr. HARDY. Is it not a fact that patents in this as in many other lines of enterprise are almost hopelessly entangled in litigation, adverse claims, one with the other?

Mr. DARBY. That is the case here more than in any other line of business.

Mr. HARDY. Marconi and the De Forest and every other company is claiming something that the other fellow claims?

Mr. DARBY. Yes, sir; and it is a situation that at present is not only distressing, but it is agonizing. It is costing the companies engaged in that litigation practically their whole substance in the litigation.

Mr. HARDY. Under those circumstances, the litigant who has the longest purse has considerable advantage over the other litigant?

Mr. DARBY. Yes, sir; that is so, and that has been demonstrated, as I have tried to show here to-day, in the litigation between the Marconi Co. and the De Forest Co. De Forest to-day is and always has been a poor man. He has not had the millions at his back to support him that Mr. Griggs tells us is back of the Marconi Co. He has been subjected to the incessant fire of patent litigation, and, so far as I can see, the only ones who have benefited by it have been patent attorneys.

Mr. HUMPHREYS. Would you limit under the terms of the law which you advised Congress to enact the amount of business that any one company shall be permitted to do?

Mr. DARBY. No, sir; I do not think that would be right.

Mr. HUMPHREYS. Well, as the law stands now, is there any legal obstacle in the way of the De Forest people going out and selling their receiving apparatus to the ships and erecting shore stations, and then erecting high-power stations and putting the Marconi people out of business, so that they would be the people to complain?

Mr. DARBY. There is no legal obstacle, so far as I know. On the other hand, there are the conflicting claims of patents. There is no legal reason why if it was a rich and powerful company, except, as it has been made clear here to-day at these hearings, the Marconi Co., or now the Navy Department, owns all of the coast stations, and they supply apparatus to vessels who use those stations which under Marconi control could only be furnished by the Marconi Co. and not by any other company.

Mr. HUMPHREYS. But there is no law to prevent you or the De Forest people from putting up some receiving stations of their own and selling their apparatus to some shipowner who wants to buy and do business with him?

Mr. DARBY. Only the law embodied in the radio regulations as they exist to-day.

Mr. HUMPHREYS. They apply to Marconi as well as to you?

Mr. DARBY. Surely, with this difference, the Marconi Co. now has the stations; it has the business. It has the supply of apparatus.

Mr. HUMPHREYS. You would not, however, advocate that some law be written on the book to enable you or anybody else to go and take it away from them?

Mr. DARBY. No.

Mr. HUMPHREYS. What they have got, I suppose, they have purchased?

Mr. DARBY. They have purchased, surely; and have built up surely. But they have acquired that business—their status to-day—not by virtue of the monopoly of their patents, but by the practice of obnoxious monopoly. That is what I complain about.

Mr. HUMPHREYS. Wherever in those practices they overstep the laws they are subject to penalties?

Mr. DARBY. Oh, yes. But, as Judge Hardy suggested the other day, there are a thousand and one ways by which that can be accomplished without going over the lines of the law.

I want to say this in justice to the De Forest Co.: That I have expressed these views here without the benefit or advantage of conferring with Dr. De Forest with respect to that. Dr. De Forest left the country in October before this matter came on. He is still abroad. I have been unable to communicate with him, and while I am speaking in behalf of the company I do so on my own personal responsibility as counsel for the company. And I may say I have been Dr. De Forest's patent counsel from the day he took out his first patent—from 1900 down to the present time.

STATEMENT OF MR. E. J. NALLY—Resumed.

Mr. NALLY. May I correct some glaring misstatements of this witness?

The CHAIRMAN. I suppose it will be logical to do so now.

Mr. NALLY. Capt. Darby said that he thought the Marconi people ought to bow their heads in shame. I, for one, of the Marconi

Co., bow my head in shame—I am ashamed of a man of Capt. Darby's ability who should prostitute those abilities the way he has been in making such glaring misstatements as he has.

Mr. HUMPHREYS. I suggest that Mr. Nally proceed in order.

The CHAIRMAN. State the facts as you understand them and let the committee decide.

Mr. NALLY. Among other things he stated that we had attempted to steal his employees. I happen to know of one case where the Marconi Co. attempted to detach one of his employees.

Mr. DARBY. But that was a matter I had reference to.

Mr. NALLY. That was where the De Forest Co. sent this employee to break into our high-power station, which he did, to steal some of our valves, which he did, and he was indicted and would have been detached from the De Forest employ for some period if it had not been for Capt. Hooper and others of the Navy Department, who personally requested me not to push the case, because this man Myer was needed in connection with some Government work, the De Forest people having said so. That is one case.

I have other cases where I have correspondence—requests from the De Forest employees to enter our employ. But they never got into our employ; I would never think of having one of them in our service.

Capt. Darby has tried to becloud the whole issue.

He would have it so that the De Forest Co. should hide behind the skirts of the Government, so that they could continue to manufacture their apparatus and continue to infringe Marconi patents. He is remarkably silent over the fact that he is now under injunction. He did not say a word about that; he did not say he was enjoined from the manufacture of this apparatus.

He also speaks—

The CHAIRMAN. Mr. Nally, what specific apparatus have you in mind?

Mr. NALLY. Judge Mayer enjoined them, in connection with the valves—the Fleming valve—and this suit which he laid so much stress on was merely a suit in accounting. Once before when they tried to have an accounting they changed their organization over night and defrauded all just rights under the demand.

He speaks of the millions back of the Marconi Co. It can not compare with the millions put into the De Forest Co., and if it had not been for certain efforts by the Marconi Co. De Forest would not be enjoying certain immunities which he does at present.

The CHAIRMAN. We will now hear Mr. Simon. Be as brief as possible. Do not thresh over old straw, which we have been hearing every day. We heard these disputes. What we want is light.

STATEMENT OF MR. EMIL J. SIMON, NEW YORK, N. Y.

Mr. SIMON. Mr. Chairman, I am a radio engineer by profession. I have made a few inventions in the radio art, and I have been engaged in the last 10 years in the development of that art. In the last three years I have designed and manufactured radio apparatus for governmental use. I have supplied the United States during the war with radio apparatus to the approximate value of \$2,000,000. I

am a designer also of marine and aircraft wireless apparatus, many sets of which are in use by the Government at this time.

I had prepared a short statement, which was largely completed before I had heard the other gentlemen who appeared before the committee discuss several of the main points that I wished to bring out, and I have accordingly cut down my statement to some extent, on that account.

I desire first to call your attention to the notable absence of support of this bill by the other departments of the Government. The State Department, you will recall, admitted its entire satisfaction with the facilities afforded the Government for radio communication, during the war, under existing laws.

Taking up the sections in the order in which they appear in the bill, I will pass the first section relating to amateurs, inasmuch as their attitude toward the provisions of the bill affecting their interests has been fully explained to the committee.

At the risk of repetition I will make a few brief remarks in regard to Government ownership as provided for in section 2. It has been the endeavor of the proponents of the bill by repeated assertion to distinguish radio from other public utilities.

How far their efforts have been successful with the members of the committee I am not in position to state, but in my opinion and the opinion of a number of representatives of private radio interests with whom I have discussed the question, the alleged difference is not only not clearly apparent but this proposed taking over by the Government is considered and being watched carefully by many as the test case on Government ownership. The War Department, for example, could just as consistently come before Congress and repeat the same arguments with reference to Government ownership of telephones, telegraph, and cables.

Aside from this contention of the interests favoring the bill, exclusive Government ownership of radio would obviously establish a precedent that would be at once a danger and menace to all other public utilities.

Now that the Marconi Co. is no longer in possession of the ship-to-shore business, the position it takes in indicating preference for Government ownership is easily accounted for by its natural reluctance to approve or favor leaving the door open to private competing interests.

Mr. HARDY. Does the Marconi Co. favor Government ownership?

Mr. SIMON. The Marconi Co. favors Government ship-to-shore operation of radio communication, I believe. They differ as to the high-power stations, but they apparently favor the Government control of operation of ship-to-shore stations, as I recall it.

In reference to Marconi's hundred per cent control of radio and the chances of a little fellow like myself, as Mr. Darby called the independent companies, the impression seems to have been created in the mind of some of the committeemen that there is or was danger of monopoly in radio in this country by the Marconi Co.

Mr. Nally's reference to 90 per cent control of radio means 90 per cent ownership in the ship-to-shore business, which, please understand, is only a small part or portion of the radio business in this country.

The CHAIRMAN. I think that was his statement.

Mr. SIMON. As a matter of fact, the Marconi Co. has never been in control nor has there ever been real danger of a Marconi monopoly. Their main hope for control was based on a Marconi patent which will expire in 1921.

The Marconi's type of patented apparatus is now being rapidly superseded by a new and better system of apparatus, which is completely outside of the scope of the Marconi patents. The patents covering this new system have now been purchased by the Navy Department, which purchase in the opinion of many, including myself, opens these inventions to the use of the public—nullifies the grant of the patents.

The **CHAIRMAN.** Make that clear, if you please.

Mr. SIMONS. The purchase by the Navy Department of the patents of the Federal Telegraph Co. covers the newer and more improved systems being generally adopted for ship-to-shore and long-distance communication. The purchase of these patents by the Government, in the opinion of many qualified lawyers, opened these inventions to the public and nullified the exclusive grant of the monopoly for the life of the patent.

Mr. HARDY. Your idea is that when the Government obtains it there is no more exclusive privilege, but that anybody may use it?

Mr. SIMON. I should think so. The Government now owns the patent.

The **CHAIRMAN.** And it would be true if the Government should buy the patent covering some shell or other munition invention necessary to the Army or Navy?

Mr. SIMON. I did not hear you.

The **CHAIRMAN.** I say, if the Government should buy a patent on some new machine gun or some new part of an Army or Navy airplane or something else, just as soon as the Government became the owner it would be open to everybody without danger of being liable to prosecution for infringement of the patent; is that your view?

Mr. SIMON. Mr. Chairman, I am not a patent attorney, but I have talked with Gov. Griggs and Mr. Pumphrey and other patent attorneys, and they think still that the purchase of the patents by the Government nullifies the grant by the Government for the exclusive monopoly for the life of the patent. That is a very broad and big question. I would not care to offer an opinion on it, as I am not a patent attorney.

Mr. HARDY. Was this invention you speak of, that was so superior to the Marconi, ever the subject of contention between the Marconi Co. and the inventor, and was there any litigation over it?

Mr. SIMON. No, sir; nothing that I know of. I believe a suit was brought and never pressed.

Mr. NALLY. By whom?

Mr. SIMON. By the Marconi Co. against the Federal Co.

Mr. NALLY. Is it still pending?

Mr. SIMON. Replying to Judge Hardy's question, I should say, from an engineering and technical point of view, it is usually considered distinct and different.

Mr. HARDY. Was there ever any attempt by the Marconi Co. to buy out the Federal Co. before the Government bought?

Mr. SIMON. I have no definite facts on that, but it is rumored, and the general understanding is that the offer by the Marconi Co. to the

Federal Co. to purchase its patents was the reason that the Government had purchased the patents from the Federal Co.

Mr. HARDY. I did not know that that was the one they spent a million dollars and something for.

Mr. SIMON. One million six hundred thousand dollars, which included some half dozen stations of the Federal Co.

Mr. HARDY. And their patent rights?

Mr. SIMON. And their patent rights. I might remark right here that those patents have never been, so far as I know, in litigation. They only have three and one-half years to run before they expire. They had never been infringed upon, if I may use that term, by the Government. So that the Government was not liable, so far as I know, to any damage by suit in a court of claims, and they have never been adjudicated as controlling patents. They are patents covering the particular use of a device, which I will admit is essential in order to operate that system successfully to-day.

In connection with the original Marconi monopoly, during the war the Marconi Co., I believe, supplied the United States Government with apparatus to the extent of some \$6,000,000, whereas the entire purchases by the Government for radio apparatus were considerably in excess of \$25,000,000. Therefore, the larger part, by far, was purchased from independent or other companies and manufacturers than the Marconi Co.

The bald suggestion of exclusive Government ownership, at this time, is crudely premature.

Most of you gentlemen will recall Prof. Pupin's testimony before this committee on the other bill, in which he likened wireless telegraph to an infant, born and reared by private interests, and his caution not to put this infant in a Government institution, where it would pine away and die.

Why, gentlemen, it is admitted by the proponents of the bill that the infant is, as yet, of such tender age that it is only with the greatest difficulty that it is able to make itself understood. I refer to "interferences" about which you have heard so much and which has been urged as the main reason why this bill should be enacted into law.

"Interference" can mean only infantile inability of this very young art to as yet function properly.

In other words, it is not old enough for adoption and needs the care and attention of its parents, the private interests, to see it through until it is able to stand alone and do credit to himself.

You will recall that in the showing made by the opponents to the other bill, it was brought to the attention of this committee that "interference," quite as serious as that here complained of, was experienced during the early stage of development of the telephone.

You will further recall that such interference was entirely overcome by the inventive efforts of private interests, as is best evidenced by the present efficiency of the telephone now in general use.

Give the radio art a fair chance and private interests will, at their own expense and within reasonable time, overcome the difficulty complained of here by the proponents of the bill.

Another thought: Is this interference, so bitterly complained of by the Navy, as serious as they would have you think it is? Some

of you may have heard the little story about a lady in an automobile inquiring of her companion whether she thought pedestrians were as sensitive to pain as they were? [Laughter.] That inquiry, in my opinion, illustrates, without much exaggeration, the position taken by the Navy with relation to the operation of wireless by private interests.

Now, as to this very objectionable interference complained of by the Navy, let us assume that private interests have equal cause for complaint. Do they come to you for relief? No. What they do is to put the trouble up to their engineers, with instructions to overcome it and the engineers get busy.

If the problem proves a difficult one, it very naturally takes time to solve, and that is precisely the situation we are facing to-day. Many very able engineers, in the pay of private interests, are working on the problem; and if undisturbed will, in due course of time, work out a satisfactory solution; but if Government ownership steps in, disrupts the outside organizations, and scatters the engineers, no further progress will be made.

Some gentlemen, in opposition to the bill, made the very pertinent inquiry as to the further need by the Navy of the high-power or transoceanic stations, pointing out that, in times of peace, our fleets seldom go far from our shores, and we were told by the Assistant Secretary of State that during the present war the State Department, in order to insure greater secrecy in the transmission of its messages, mainly used the cables and only occasionally resorted to wireless.

From all I gather from what has been said, so far as Government ownership of present existing radio stations is concerned, the purchase of the few remaining high-power or transoceanic stations would put the Government in full possession of the field.

That brings me to section 3 of the bill. Section 3 prohibits the maintenance or operation on land or on a permanently moored vessel, etc., of any radio station, etc.

It may be helpful to you to keep in mind that the term "station" as used in the discussion of the bill before the committee applies to any wireless apparatus, whether receiving or transmitting, or receiving and transmitting, wherever set up for operation, on land or on ships.

Under the prohibition provided in section 3 it would be a penal offense against the law for anyone excepting the Navy to operate wireless telegraph apparatus anywhere in the United States.

What would that mean? Here, now, we have a dozen or more well-known and well-established manufacturers of wireless apparatus, each employing a number of radio engineers and others skilled in radio manufacture.

What is to become of these organizations? The only outlet for their product will be the Navy Department, as all ships required to have wireless have been equipped with it by the Navy for purposes of the war, and, with care, such equipment may be made to last for years, so that there will be practically no market for wireless other than that created by the needs of the Navy Department.

If the calls to be made for wireless apparatus by the Navy do not exceed the prewar calls, and there is no reason to believe they will, there will not be enough business to justify existing organizations continuing in business; and they will therefore either go out of busi-

ness or reorganize for the purpose of taking up other lines of manufacture.

In either case, their radio engineers and workmen skilled in radio manufacture, will shortly become scattered and lost sight of, and of the present exceptionally efficient radio force there will be left only one or possibly two companies of necessarily limited output.

It must not be lost sight of that the invention and development of radio to its present state was by private interests and not by Navy or Government employees. That was admitted by Commander Hooper in his testimony before the committee. He was unable to cite a single radio invention of any importance that had been made by a Navy man.

It is also important to bear in mind that the work of the Navy in establishing ship and shore stations for war purposes, about which the gentlemen of the Navy spoke with considerable pride, was made possible of accomplishment only by reason of the existence of private manufacturing companies, which companies designed, developed, and made available for use of the Navy all the wireless apparatus now in its possession.

Without the aid of these outside sources of development and supply of radio apparatus, the position of the Navy at the outbreak of the war would have been extremely critical; yet the Navy, in its ambition for expansion and power, now proposes, by way of return, to sacrifice these loyal interests that made its success possible.

The threatened scattering of the present forces and their necessary abandonment of radio for other branches of engineering, can have only one effect on development, and that will be to bring it practically to a standstill. There will be no inducement for engineers to devote themselves to improving radio apparatus, which, under the terms of the present bill, can not be used, unless purchased by the Navy, and then only for governmental purposes.

I can not pass without comment Commander Hooper's amazing statement to the committee that radio patents are essentially different from patents on other things, and must, therefore, be treated differently, or words to that effect. He did not make clear how, why, or in what respect radio patents differ from other patents, and we are left somewhat in the dark as to the process of reasoning under which he arrived at that conclusion.

Inasmuch as patents, to the lay mind, are ordinarily both mysterious and confusing, it is suggested, by way of explanation, that perhaps the only patents that have come under Commander Hooper's notice have been those relating to radio. You will, of course, understand that, as a matter of fact, all patents are alike under the law, and differ only as to subject matter.

Commander Hooper's further statement, in substance, that the Marconi Co. has been unable to get the right kind of decisions from the courts on their patents was certainly not the fault of the courts, but was due, rather, to the limitations of the patents as brought out by the defense.

The chairman of the committee remarked that he would certainly not favor the bill if, as Mr. Edmonds stated, its effect would be disastrous upon radio patents. There can be no question or doubt that Mr. Edmonds was entirely correct in the statement made, as we shall now show.

Let me assume the bill to be enacted into law and that the existing radio patents, numbering over 1,000, are submitted by their owners, for adoption and use by the Navy Department, the only market, under the bill, open for such apparatus. Let us say, for purposes of illustration, that the Navy accepts 100 of the patented improvements and rejects, for various reasons, the remaining 900. Of what possible value or use are the rejected patents to their owners?

It is true that every patent is supposed to be a grant, presumably made in good faith by the Government to the patentee, for the term of seventeen years, of the exclusive right to make, use, and sell the invention throughout the United States, etc., but this bill nullifies the grant, by imposing a fine, imprisonment, and forfeiture of the apparatus, whenever and wherever the invention of the patent is used in the United States, unless such use is by the Navy.

The effect, therefore, of the bill on all existing and future radio patents, not adopted and used by the Navy, would be to prohibit their use and thereby render them valueless.

It is readily conceived that some of these blacklisted patents might disclose very important advances in that branch of the art relating to wireless telephone service abroad moving trains, which would be of inestimable value, if use and development were permitted, but the proposed law says "No," and that settles it.

Many other advances in the art, making possible, for example, the combination of the wireless telephone with the present wire lines, in general use in residences and offices, thus providing public telephone service with ships at sea, would likewise be barred.

As a result of the operation of such a law, our American radio inventors would undoubtedly be driven into those foreign countries, where opportunity is given them to develop and exploit their inventions in their own way and free of Government restrictions.

Section 4 of the bill, giving the Navy, a military branch of the Government, power to carry out the provisions of the law, would be a dangerous experiment in a democratic country such as ours and a decided step toward military domination or Prussianism.

The recent raids in New York and other eastern cities by the Army and the Navy in rounding up slackers, and incidentally including with them hundreds of innocent citizens, illustrates the heavy-handed methods likely to be employed by the military against the people if given authority under the law.

The CHAIRMAN. You do not think the slackers ought to have been gathered up, then?

Mr. SIMON. I do, but I do not think they ought to have been gathered up in that way.

The CHAIRMAN. I do not know what way was employed to gather them up, but I think they ought to have been gathered up just the same.

Mr. SIMON. But by due process of law.

The CHAIRMAN. We had to adopt some special measures to provide for patriotism of some people during the period of the war.

Mr. SIMON. It would appear absurdly inconsistent, while President Wilson is in Europe preaching "Peace on earth, good will to man," for Congress, in time of peace, to authorize the use of the "mailed fist against the American people."

The special licenses for emergency use in cases where no other rapid means of communication are available, provided for by section 5 of the bill, appear to be intended mainly, if not entirely, for military purposes as an aid in maintaining order and control under abnormal conditions, such as in cases of floods, fires, riots, strikes, etc. No provision is made for granting such licenses in time of peace, with conditions normal, and this section is objected to as further and unnecessarily increasing the power of the military branch of the Government and as wholly superfluous in the bill in view of the sections above discussed, which give the Navy full power for all purposes.

It was agreed by the gentlemen of the Navy that section 6 should be canceled, and comment with reference to this section 15 is therefore unnecessary.

Mr. HARDY. I do not know whether I understood you to say that if there is a question of prohibition of the erection of private stations you would object to the right of the Secretary to grant a special license under emergencies and things of that sort.

Mr. SIMON. No; I did not say that. You mean the statement I just made about section 6?

Mr. HARDY. No; section 5, I thought you said was objectionable because it allowed the Secretary to grant special licenses.

Mr. SIMON. Only for emergency purposes, and I interpret that to mean cases of floods, fires, riots, etc., not for general peaceful purposes.

Mr. HARDY. Do you want to take away that power?

Mr. SIMON. I say the section is useless in that the power has already been taken away.

The CHAIRMAN. I believe you are not a lawyer?

Mr. SIMON. No; I am not.

The CHAIRMAN. That would not be susceptible of that view, is my opinion.

Mr. SIMON. I may be entirely wrong.

The meaning and purpose of section 7 is not clear. If the Navy is to own all radio stations, under the provisions of section 2, and no additional stations can be operated, in view of the provisions of section 3, then there would be no other stations to which licenses could be issued under the act entitled "An act to regulate radio communication," approved August 13, 1912.

Section 8 has, I believe, been fully discussed, excepting the last clause providing for an appropriation sufficient to make "just compensation," in an amount, as yet, undetermined definitely, but known to run into many millions of dollars.

This uncertainty would appear to cast doubt upon the wisdom of such legislation.

Mr. HUMPHREYS. Do you think Congress should make an appropriation to pay just compensation for stations that might be taken over?

Mr. SIMON. Yes; I do; but I say there are so many elements entering into patent rights and the cost of development that it is uncertain how much the Government will have to pay eventually for the taking over of this property.

Mr. HUMPHREYS. You think they ought to pay just compensation, *however much that may run up.*

Mr. SIMON. Exactly. But I believe there is a great deal more involved than the mere phraseology of the bill indicates.

Mr. BURROUGHS. Your idea is against the whole policy of taking over anything at all?

Mr. SIMON. Exactly. I am in favor of the continuation of existing law, or possibly a modification of that law to meet the requirements of the present day, as would be brought out by an international commission, which undoubtedly will meet in a year or two.

With regard to sections 9 and 10, I wish to say that I believe the Secretary of Commerce should be substituted for the Secretary of the Navy, as is the case in existing law.

Mr. ROWE. How long have you been in the manufacturing business in this line?

Mr. SIMON. Individually, 3 years; with other companies, 10 years.

Mr. ROWE. Thirteen years in all?

Mr. SIMON. No; I beg your pardon—7 with the other parties and 3 individually, and that makes 10 years.

Mr. ROWE. You have built up quite a large business, have you not?

Mr. SIMON. During the war, of course, the demands of the Government were so great that they called on everyone who was qualified to build as much apparatus as they could produce, and during that period I turned out all I could for the Government.

Mr. ROWE. You have not felt that there was more competition in this line than there is in other lines of manufacture, have you?

Mr. SIMON. I have never been in any other line, but I have enjoyed competition. I am a great believer in competition as being an incentive to greater effort.

Mr. ROWE. Did you start with large capital?

Mr. SIMON. I started with nothing.

Mr. ROWE. There is still a chance for other people to build up a business in this line if they want to, as you think?

Mr. SIMON. I certainly think there is. I had associated with me during the war and still have a large number of the younger class of radio engineers who have exactly the same future before them, I hope, that I have had, and opportunity to do exactly what I did; that is, eventually to leave the employ of companies and develop their own inventions and ideas and obtain the profit for it that is due them.

Mr. ROWE. Then you do not think the Marconi Co. is monopolizing the business?

Mr. SIMON. I do not. The Marconi Co., as you have heard, has brought suit against me here, and in Canada, and I have been able to properly defend myself in all such cases, I believe.

The CHAIRMAN. We will now hear Mr. McClellan.

STATEMENT OF MR. GEORGE McK. McCLELLAN, REPRESENTING THE HONOLULU CHAMBER OF COMMERCE, HONOLULU, HAWAII.

Mr. McCLELLAN. My name is George McK. McClellan, and I represent the Chamber of Commerce of Honolulu.

The Honolulu Chamber of Commerce, Mr. Chairman, is very loath to enter any appearance here to oppose any measure that has been introduced by the chairman of this committee, because of our personal regard for him and the confidence we have in his work.

The CHAIRMAN. You need not have any compunction on that score.

Mr. McCLELLAN. But this bill is so far reaching—

The CHAIRMAN (interposing). My impressions on this question, as in the case of all bills that come before this committee for consideration, are open to conviction.

Mr. McCLELLAN. A part of one of the cablegrams which I have received from the chamber of commerce states in regard to this matter that I am asked to oppose the bill providing for the Government taking over point-to-point transoceanic radio systems, that Hawaii has had no commercial radio service during Navy control, but now that peace prevails there is no need of radio control; that there is no apparent attempt on the part of the Navy to take care of commercial business since the armistice has been declared; that with cables congested we are without rapid communication, and we request that you protest against any measure placing the Government in control of either the cables or the radio service.

The CHAIRMAN. I will just say that the clerk has handed me a telegram from Hawaii, which I believe is in exact terms with the one which you referred to, and hence it will not be necessary to put this in the record.

Mr. McCLELLAN. Mr. Chairman, it is perhaps worth noticing that in the Hawaiian Islands was first made a successful commercial use of the wireless telegraph. We are not novices in Hawaii on the question of wireless telegraphy. We had the first successful operating system, so far as my information goes—I believe I am correct in that—that there was anywhere in the world. We had local men who have participated in the improvement of the apparatus, and at the present time in addition to that old established wireless, the inter-island system, we have four high-power stations on the islands of Oahu, on which Honolulu is located. There is the high-power station constructed by the Navy Department at Pearl Harbor, which is tuned and powered to communicate directly with the Arlington station and Panama and all the long-distance stations. Two are high-power Marconi stations and one of the Poulson system, referred to as the Federal, which has been purchased by the Navy Department.

There have been a good many statements made here, gentlemen, before this committee about the interference which has been met with in the operation of these systems. I call your attention to this fact that in the Hawaiian Islands, all within a scope of 200 miles, the longest range of the interisland system, you have located these other four high-power stations, and those have been operated, as I say, since the beginning of wireless operation and have been coordinated successfully, which would seem to indicate that there is no inherent necessary conflict.

The CHAIRMAN. Did you state where these stations are located?

Mr. McCLELLAN. I did not state on what part of the islands they are located, Mr. Chairman. One is located on the windward or eastward side of Oahu, one at Cocoa Head, and one at Pearl Harbor, and one at Kahuku.

The CHAIRMAN. Within what radius?

Mr. McCLELLAN. Well, there is a total radius there of, I should say, offhand, 40 or 50 miles airline, but the stations at Cocoa Head and Pearl Harbor are close to the interisland station, so that, although some of the others are far away, they have not found serious

difficulty in the question of coordinating those high-power stations with the lower, which convinces me that the statements made here, that it was physically necessary for the Navy Department to have charge of all these systems in order to coordinate the question of wave lengths, is not well founded in fact.

If the Wanamaker intercommunicating stations are interfering with the Navy, it is either because they are not conforming with the regulations, which should properly be laid down, or else because the Navy operators are incompetent or have improper apparatus; one or the other. The interference is not necessary, and achievement enough has already been made so that there is no necessary conflict between those things, and I do not think that this committee should proceed in their decision on whether or not they will adopt this bill with any representations made here that is necessary from a physical point of view, because it is not.

One man can get up here and say one thing and another man can get up here and say another, but I am citing to you, gentlemen, the point in the world where wireless has been operated longer than any other, and I am telling you facts of what has occurred, not my theory of what may or may not be done: I am not a wireless operator and I can not tell you exactly about the meters, and wave lengths, but I can tell you that those two systems have been working side by side without interference, which is the important thing after all.

Mr. ROWE. Do you mean they work side by side or that no interference, as a matter of fact, exists of operation?

Mr. McCLELLAN. No serious conditions arise from working side by side.

Mr. ROWE. How do you know that?

Mr. McCLELLAN. I live there and the thing has gone on year after year.

Mr. ROWE. And you have heard no complaints by the operators of these particular stations as to any interference in the operation of their particular plant?

Mr. McCLELLAN. There may have been individual cases and there were difficulties as the system was being worked up, but the point is that the interisland system has been working continuously from the very founding, as I say, of the commercial.

Mr. ROWE. Do you know why there should be any difference in respect to those four stations in Hawaii than existed with respect to four similarly located stations on the Atlantic seaboard?

Mr. McCLELLAN. I do not know; I can not speak for the Atlantic seaboard, but I can imagine it.

Now, then, it is to be considered that after the interisland wireless system was first established came the Marconi long-distance stations. After that was in operation came also the Poulson or Federal system, and they succeeded in operating. I can not tell you in detail what their relation or coordination was, but both have been operating commercially and they must have been doing so without interfering. They have sent messages back and forth. I have done so frequently; I have occasion constantly to be communicating with the islands; and I suppose I have sent ordinarily, say, 25 or 30 messages a month. That is just simply in the day's work, and our merchants do the same thing, and the newspapers carry news twice a day,

or, they have—I am speaking of previous to war conditions—the newspapers carry twice a day the Associated Press dispatches transmitted by wireless. They have depended exclusively on the wireless, and have thrown over the use of the cable entirely for news. They have received all of their press dispatches by wireless and have gotten them just the same as we have our milk delivered at the house in time for breakfast, which does not look as though there was very much interference.

Mr. ROWE. I just want to understand if you take the emphatic position that, for instance, the naval station at Pearl Harbor and the commercial station located near Pearl Harbor, if they were operating on the same wave lengths, would have absolutely no interference in the transmission of messages on those two respective stations?

Mr. McCLELLAN. I am citing the fact that after the Marconi was already in operation that the Poulson system came in and operated alongside of it satisfactorily, and that subsequent to that the Navy itself came in and established a high-power station of its own at Pearl Harbor and that they operated successfully without interference.

As to the question of ship to shore business, I believe I am correct when I state—I have had that confirmed by one of the Navy men since these hearings have been going on—that these are all taken by the interisland company in Hawaii.

In Hawaii we lead a very peculiar, isolated life. We are out there in the middle of the Pacific Ocean, cut off from the world by 2,000 miles of ocean, under the necessity of carrying on our commercial affairs with those limitations, and it must be evident that any limitations on our communication is a very serious matter, because, due to vessels sailings and merchants in Honolulu must do more cabling and use more wireless communication than would be the case in this country where a shipment could be made any day or several times a day.

During the war the Government has taken over all of the high-power stations, as you know. The commercial business has been entirely excluded from those lines. It would perhaps be useless to enter now into discussion on whether that policy was necessary or not. The people of Hawaii were so interested in this war, so willing to do everything that they could for it, that they submitted to that thing while they believed very freely that it was not necessary. But, however that may have been, if the Navy was not willing to accept a commercial message from a man who had sent his sons into the aviation service or into the ranks of the army in France, whether or not they trusted his loyalty or thought it inadvisable to allow any commercial message to go, that at least does not apply to the messages since the armistice has been concluded. But to-day the Navy still has control of these systems and commercial business is still excluded from these lines, although it is difficult to imagine any way by which the use of those lines now could give aid or comfort to the German Army.

The CHAIRMAN. It would be a pretty good way to demonstrate it.

Mr. McCLELLAN. In what way?

The CHAIRMAN. By opening up the lines to commercial business.

Mr. McCLELLAN. It would seem a golden opportunity to illustrate to the world how wonderfully efficient they could be in operating in an efficient way.

Mr. HARDY. Have you made any application to the Navy to open up the wireless for messages, or anything of the kind, in Hawaii? A gentleman here tells me that they were opened last night.

Mr. GREENE. They heard the sound from here.

Mr. McCLELLAN. It may have been an echo from these hearings.

Mr. HARDY. You realize, Mr. McClellan, that at the close of this war a great Nation like this could not do everything the next morning?

Mr. McCLELLAN. That is very true, but an order of that sort is one of the shortest things that could be done quickly and readily and spells itself so freely that there is not a private enterprise on earth that would not have had that thing done the next morning, and that comes right to the very foundation of this whole question, Judge Hardy, as to whether or not the Government should handle the commercial business of this country.

Mr. HARDY. How long before you applied to the Navy Department?

Mr. McCLELLAN. If I was in Honolulu instead of here I could answer that question, but I would answer it in this way, that in my opinion, the Navy having taken the initiative in appropriating those lines, it was up to them to open the wireless communication without anybody making a request.

Mr. HARDY. Still, if you wanted them you should have asked for them.

The CHAIRMAN. I would say that within 30 days or a little over is not a very long time.

Mr. McCLELLAN. I have made similar requests in the past.

Mr. HARDY. I am talking about this matter, not "similar" matters. Do you know anything about whether they asked to have the wireless opened up or not?

Mr. McCLELLAN. I can not answer, but I would risk my hope of Heaven on the assertion that they have.

Mr. HARDY. Some of us, you know, have not got very high hopes in that regard. [Laughter.]

Mr. McCLELLAN. That, of course, is an open question.

Mr. ROWE. Mr. McClellan, right on that point, do you think it is a conservative position, looking at it from the standpoint of national security and sense, that it is entirely prudent for the Navy Department, with all its responsibilities, to look at this particular matter from a different angle from what you would as a commercial viewpoint, and probably would exercise more caution in throwing those wireless stations open to the public than you would likely do from the standpoint of a commercial interest?

Mr. McCLELLAN. I could answer that question by illustrating—

Mr. ROWE (interposing). In other words, you are looking at it entirely from the angle of a commercial man and you do not seem to give consideration to the element of caution and prudence that might have been desirable to use by the Navy.

Mr. McCLELLAN. I want to say this in answer to that question, that in this war Hawaii showed her interest and devotion to the cause of the country, although only a territory, remote, in the middle of the Pacific Ocean, and that she placed more men in the service in proportion to her citizen population than any other State of the Union; Hawaii has subscribed more money for Liberty loan bonds, has given

more money per capita for the Red Cross, and furnished more men participating in the Red Cross per capita basis than any State of the Union, and has had, of course, numerous of her sons killed and wounded in the war. That much is to show you what her interest in the war was.

In addition to that Hawaii, in order to show her willingness to cooperate with any request, when the Food Administration started out, accepted—which we did not under the conditions have to accept—the regulations as set forth by the Food Administration for her chief product, which is sugar, on the basis, which, if it had been made in the same way with respect to cotton and wheat would have made a difference of \$50,000,000.

Mr. ROWE. I am not impugning Hawaii.

Mr. McCLELLAN. Hawaii was interested in this war and consequently would not want to interfere, but when you get down to the question of the actual situation there are certain things we all know. A man on the street knows some things just as well as a college professor, and a clerk in a dry goods store knows some things as well as a Justice of the United States Supreme Court.

When it came to cutting out all messages from San Francisco to Honolulu, irrespective of the dependability of the person who sent them or the nature of that message, it may have been necessary from the Government's standpoint, but if you will put yourself in our place in Hawaii you can answer the question for yourself. Having cut out all of the wireless—

Mr. HARDY (interposing). It seems to me, if you will pardon me, you are now discussing the policy of the Government during the war.

Mr. McCLELLAN. That is the question the gentleman asked.

Mr. HARDY. I do not see what it pertains to with respect to this bill.

Mr. McCLELLAN. I am not here for that purpose. I am here only for the purpose of showing that when the Government is in control of a public utility what actually happens in this, gentlemen, that a set of Government employees are in control. So far as the actual needs of the Government are concerned Hawaii, like any State of the Union, is willing to make any sacrifice—there is not any question about that—but when it comes to a question of sacrificing necessary things to meet the ideas of a certain number of Government officers or employees who have the "say" about that thing, you are facing then a practical question which a business man has a right to discuss on its merits and to present on its merits. That is the question at issue: it is not a question of whether you are loyal to the Government. It is a question of whether you are capable of considering matters involving citizens who are paying taxes and all that sort of thing, whether they are just as loyal to the Government and whether their judgment is just as good as that of these Navy men, who are a fine, loyal set of men, and we are all proud of them. But, after all, they are human men, and they are subject to errors of judgment, certainly as much as business men who carry large affairs and who have done so for many years.

Mr. HARDY. Somehow you think that a monopoly in the hands of the Government will be more irksome than if it were in the hands of a private concern?

Mr. McCLELLAN. I was going to proceed to tell you why I thought so, Judge Hardy. In this case in Hawaii where we were cut off from the use of wireless, we were also cut off from the use of the cable in the matter of a personal message of any sort whatsoever, so that, for example, if I were in Washington, representing the chamber of commerce, and my wife and boy remained in Honolulu, or if a merchant in Honolulu was kept there by the emergencies of the war and his wife had to come over here to keep their children in college, and one of those children should be sick and at the point of death, that child might die and be buried and the wife could by no manner of means communicate with the father, although they were well known.

Mr. HARDY. You must have had some very cruel people over there in charge of the wireless or cable?

Mr. McCLELLAN. That, sir, is just exactly what I am coming to—not that I was there, it is true—but that you put in the hands of one man in the Hawaiian Islands the power to say whether or not any message should go, and he said “no”; and those cases I cite have occurred again and again, Judge Hardy, during this war. People have died and been buried and their families did not know about it and could not find out.

Mr. HARDY. I think you ought to have court-martialed the man in charge of things over there.

Mr. McCLELLAN. I want to say to you that if you should go into executive session I could tell you more than I am saying now.

Mr. HARDY. You ought to make a complaint against that officer.

Mr. McCLELLAN. Gentlemen, so far as I am concerned, representing the chamber of commerce, I am not here for the purpose of making a complaint about what has been done. I am stating these things to illustrate to this committee what inevitably happens as a part of bureaucratic administration of affairs, and it must necessarily be bureaucratic; you can not have Government control of anything except by bureaucracy, by any device I have heard of.

Mr. ROWE. Do you not imagine that France and Italy and England and all the other belligerent nations exercised arbitrary control over the cables and wireless during the war and the period of hostilities?

Mr. McCLELLAN. The point is that when the Government had control of anything that is what it comes down to in the end, that certain officers and employees have the “say” and that those officers and employees are not responsible to the public in the same way that an employee of a corporation is, for the very good and simple reason that most of them hold positions practically for life and it does not make a great deal of difference whether things go one way or another way. That is not the case under a commercial system, where a man must make a certain response to public conditions under private ownership.

So far as the situation there is concerned, I can not see any reason—and my belief is that if the communication system of those countries had been under private control when the armistice was declared and it was known two or three days before it was to be declared approximately on Monday, the 11th day of November, every one of them would have had an order ready and it would have been in effect by

12 o'clock on Monday, November 11th, to reopen those communications to the public. As it is, the officer informed me it was done——

The CHAIRMAN (interposing). They should all have been opened up the next day regardless of where the German submarines were and what was necessary for the protection of our country; that would have been your conception of the national defense and sound national policy?

Mr. McCLELLAN. I am looking at it——

The CHAIRMAN (interposing). You are just looking at it from a cold blooded, commercialism point of view.

Mr. McCLELLAN. There was not a German submarine in the Pacific Ocean.

The CHAIRMAN. If those stations had been open generally they could have communicated with Japan or South America or even with Europe from the wireless stations in Honolulu—they are high-power stations?

Mr. McCLELLAN. Yes. I have spoken in part on the question of necessity, but I want to make this point, that so far as the practical necessity of having the Government take over this control, that seems to me to be finally answered by the fact that the largest shipping stations in the world have not given wireless over to the Government control; and, so far as I am concerned, I have more confidence in the experience than in the prediction, even, of men who are very much abler and brighter than I am.

I do want to say, Mr. Chairman, however, that so far as the comment as to things commercial are concerned, that the questions involved in that have been only commercialism which was absolutely necessary to the winning of the war, and not of the making of money. I think it would be unfair to Hawaii and to other parts of the country to have it stated otherwise, because that is the question involved. The Army and the Navy could not operate without food. The Food Administration has been beseeching us all through the period of the war to keep up and increase the output of sugar, and yet these very restrictions here have been putting on the brakes to interfere with the very production of foodstuffs which the Food Administration were begging us to work out. It was not a question of commercialism, but a question of carrying on the world's necessary work and business in a way that would not interfere with the Government's affairs, but what should be actually constructive help to it, and it was not a question of commercialism without regard to the welfare of the country.

So far as the statements that have been made here as to the alternative of a Government monopoly or Marconi monopoly, I have no interest in that matter, except the interest of the Hawaiian Islands. We are not stockholders in the Marconi Co.—I mean the people of the Hawaiian Islands—to anything more than a possible negligible extent. So that I hold no possible brief for the Marconi Co., but I want to point out the fact that individual and single companies like the Kilbourne and Clarke Co., of Seattle have become very large manufacturers of apparatus. That the whole Federal system was developed, the Polsom system, after the Marconi people were in the field all goes to show that there is no natural or inherent monopoly in wireless communication, and that any statements made to

this committee that the alternative lies in the Government taking over this whole thing as a single monopoly or having one company have the monopoly is unfounded in fact, in the light of experience of the art and the business use of the art up to the present time.

Mr. HARDY. Mr. McClellan, you understand monopolies do not grow up in a week or a month?

Mr. McCLELLAN. Yes.

Mr. HARDY. You understand in the beginning of wireless there could not have been a monopoly with only a half dozen stations, but as time goes on—you heard Mr. Nally's statement—was there anything unreasonable in what he said?

Mr. McCLELLAN. I did not hear Mr. Nally's statement.

Mr. HARDY. He said as to the ship-to-shore business they controlled 90 per cent of it when the war broke out, and that he expected to control 100 per cent of it in this country. That may not be a monopoly in your judgment, but it is in mine. That is his statement, and he is the head of the Marconi Co.

Mr. McCLELLAN. With all due respect to Mr. Nally, I would say he is probably not inclined to minimize the participation of the Marconi Co. in the business.

Mr. HARDY. Do you not think he knows more about it than you do?

Mr. McCLELLAN. It is quite possible he does, and it is also possible that others know more about the outside business, too, than he does, which he may not have given very much attention to.

Mr. HARDY. He was speaking of this ship-to-shore business.

Mr. McCLELLAN. I understand, but it has just been stated here uncontroverted that out of the business furnished to the Government out of this war about 24 per cent—

Mr. HARDY. I am not talking about those wireless messages.

Mr. McCLELLAN. There was a time, Judge Hardy, when the Western Union Telegraph Co. had an actual monopoly of commercial telegraphy in this country. But even after having been established many years it did not prevent the Postal company becoming a real competitor, and I would say that when the time comes that the Marconi Co. does achieve a monopoly, and if they use that monopoly in a way that will interfere with the transaction of business it will be time enough to meet that situation. But so far as our experience in Hawaii is concerned, our judgment is that the development of that sort would be much more desirable than to have the Government have the monopoly.

I want to speak about that question of desirability.

The CHAIRMAN. Be as brief as you can. I would like to get through with a couple more of these men this evening.

Mr. McCLELLAN. I believe I have occupied considerably less time, Judge Alexander, than most of the other speakers, and I would like to cover two or three more points.

The CHAIRMAN. I say, be as brief as you can, and do not repeat too much of the argument we have already heard.

Mr. McCLELLAN. It is a fact too well established to be argued here that whatever activities the Government may have engaged in they can not deal strictly on a business basis. I do not think there are very many people who contend that it can do so, and just as an illustration of that is the difference which has been shown in the re-

sourcefulness of private business meeting the situation and necessity of developing the dyestuff business in this country after war was declared as compared with the Government's efforts with unlimited money and power to commandeer and give priority orders for every part of their business, to develop gases for warfare. The other evening a very extensive dinner was given to the commander of that department of the Government's work and he told about the wonderful things that would have happened from American producers of gases if the war had gone on. But as a matter of fact, not very much had been done during the history of the war. However, when the same situation came before private business, with the necessity of developing the dyestuff industry, they did it and did it quickly, and did not have priority orders and unlimited capital at their disposal to work it out.

The CHAIRMAN. That was done before we became active in the war, and yet the gas business has been developed in the last twelve months—a marvelous development—and I can not imagine any private concern having done what the Government did, and I think you would agree with that if you were familiar with the facts.

Mr. McCLELLAN. I have kept somewhat in touch with that, and my judgment was that so far as the accomplishment was concerned, that greater quickness in meeting the situation was achieved by the private initiative in the case of dyestuffs.

So far as the statement which has been made to this committee, which is a very important one—I refer to the statement made by the Secretary—that the Government's taking over a great system would mean reduction of rates and better service to the public, I wish to say that I do not see how that expectation could be fairly entertained. We have before us the actual experience of the Government's taking over the carrier lines of the country and giving an increase of rates beyond the dreams of any railroad president who has ever lived, and yet those railroads are showing reduced earnings at the present time; and I do not believe there are more than a handful of trained business men in this country who believe that the Government should operate these lines, however necessary it might be from other points of view. It might be necessary as a national policy to have it done, but to say they can do it and save money on it is appealing, in my opinion, to the credulity of this committee and the country.

The CHAIRMAN. I do not think it is necessary to criticize the activities of the Government during the prosecution of this war to determine whether or not this bill has merits, because in all these agitations the very best civilian expert talent in the United States has been called into the employment of the Government, and these achievements have been under their impulse and by virtue of their experience. You are going too far in your effort to make your case, and it is not necessary.

Mr. McCLELLAN. I am not unnecessarily, Judge Alexander, slamming anybody; I am pointing to a fact which is certainly very vital, and this question of whether or not this country shall embark on general Government control of wireless—

The CHAIRMAN (interposing). It is not necessary to do that to criticize these activities of the Government through these civilian agencies which were called into the service of the Government, be-

cause they have been the greatest contribution to the successful prosecution of the war.

Mr. McCLELLAN. I am referring simply here to the results of experience.

Mr. HARDY. If I understand you aright, Mr. McClellan, as soon as these great civilian administrators like Schwab and the rest of them got into the Government employ they became inefficient and the Government employ made them poor and sorry executives. The Government utilized the best talent that the country was supposed to have, but you say their administration of affairs was wonderfully crippled as soon as they got under the Government?

Mr. McCLELLAN. If the stenographer finds anything in the record where I said the administration of the Government was crippled, I would be glad to have it read back.

Mr. HARDY. You said the railroad service deteriorated in quality while it increased in cost of operation, and all because it was under the Government.

Mr. McCLELLAN. If there was a statement that I made that the quality of the service deteriorated, I would be glad to have it read back to me. I would rather not have myself misrepresented in the record.

Mr. HARDY. If you did not state that, I withdraw that part, but you certainly said there was increases in cost of operation.

Mr. McCLELLAN. I stated that after increases had been made greatly beyond what any railroad president has known—

Mr. HARDY (interposing). The income depreciated?

Mr. McCLELLAN. Still I know the income of some of these roads, and the most important ones, is showing a decreasing rate of earnings.

Mr. HARDY. And yet the Government had the best experts the railroads could furnish them to run these trains, did it not?

Mr. McCLELLAN. My judgment, sir, is that the Government can not in the form of Government agencies use the best talent. Of course the Government does everything—

Mr. HARDY. Then there is something about the fact that it is the Government that causes defective administration, although they have the same men?

Mr. McCLELLAN. I think there is an inherent incapacity for the Government to carry on business affairs as compared with private interest.

Mr. HARDY. Even though employing the very same men?

Mr. McCLELLAN. Even though employing the very same men, because—

Mr. HARDY (interposing). What is the mystery that these men can not do as well for the Government as they do for private concerns?

Mr. McCLELLAN. I do not think it is a "mystery." As Theodore N. Vail has pointed out, one of the fundamentals is that in the Government system men, for the most part, have a life tenure of their position. There is not the same incentive to work, and that the human being is not sufficiently far advanced but what he still needs the incentive of necessity and personal competition to bring out the best there is in him.

Mr. HARDY. Did anybody employed in the running of these railroads have a life position?

Mr. McCLELLAN. The men under them—

Mr. HARDY (interposing). We are talking about the railroads. Stick to that.

Mr. McCLELLAN. The men who are running the railroads, of course, have been dealing with a new situation.

Mr. HARDY. Is not that the whole thing, or very largely so? Were not the railroads breaking down when the Government took over transportation? That was the condition that was producing confusion everywhere. Is it fair to hold that up as a stigma against any of the officials under the conditions the railroads were taken over and attempted to be run?

Mr. McCLELLAN. I think that, of course, the question of the condition of the railroads is too long a story to go into.

Mr. HARDY. You brought it out by these references that seemed to me to be unfair to the administration.

Mr. McCLELLAN. My contention is that the Government can not do—

Mr. HARDY (interposing). But you were giving this as an illustration.

Mr. McCLELLAN. And the reason for it is that the Government necessarily does its work through a system of bureaucracy and in the main with a life tenure, and there is not a member of this committee who does not know that you can go into any department of this Government and see employees there who are simply there because they have been with the Government a long while and the Government will not discharge them.

Mr. HARDY. I happen to have been on the Committee on Reform of the Civil Service, and I know that the heads of departments have kept old men under the pitiful plea that it was hard to "turn the horse out after old age," and that was for the purpose of building up the question of old-age pensions. I grant there has been some of that, but if I had been the head of the department I might too have been guilty of saying "Here is a man walking down life, and I do not like to turn him out." And the tendency of the Government has caused some extravagance, I grant that.

Mr. McCLELLAN. One point is that the Government, so far as I can understand the policy of the Navy Department in acquiring these lines that have already been acquired for Government operation, has never been authorized by Congress although funds for their purchase was authorized by Congress. If I am mistaken in that, I would be glad to be corrected.

It has been argued before this committee that because the Government department has done something heretofore unauthorized by Congress and has reached a certain stage, because they have acquired a certain amount of these shore stations, that therefore for that reason Congress should now go on and authorize further acquisition—that seems to me to be a very poor line of argument and rather a subversion of the mental idea that the just powers of Government are derived from the consent of the governed. It seems to me, gentlemen, that that is rather a fundamental question which is directly involved here.

In addition to that, as has been pointed out—and I think it is worth repeating—you are dealing with the last element now. You talked always about the "freedom of the air." The air is free, but if you are going to give an absolute monopoly of the use of the air

to the Government, so far as wireless telegraphy is concerned, it will inevitably follow that you will also find the Government demanding and receiving the absolute, the monopoly, of the use of the air for transmission, for use by airships, and you are going on from one step to another to make the Government the thing instead of the private initiative of this country.

And I want to say to you, gentlemen of this committee, that at a time when we are closing a great war which is supposed to have been for the benefit of the individual, the freedom of the individual, that it would be a very grave and serious mistake to have any such policy as this adopted. To go to the proposition of having the Government secure absolute monopoly of a utility of this far-reaching import, because it will mean that just as it has meant in many cases, that an individual employee of the Government who happened to join the service 25 or 30 years before and is still kept on the pay rolls, will have the power of saying in certain cases, "You shall do this; you shall not do that." And while we are everyone of us willing to do anything that is necessary to support the Government, we do not want a state of affairs where the individual employee whom the President can not check up and the Secretary of the Navy does not have the time to check up, that that one man has the power of saying practically what a community shall do.

The CHAIRMAN. We will now hear Mr. Israel.

STATEMENT OF MR. LESTER L. ISRAEL, NEW YORK CITY, N. Y.

The CHAIRMAN. What is your business?

Mr. ISRAEL. Radio engineer, by profession.

The CHAIRMAN. Are you connected with any firm?

Mr. ISRAEL. I am now associated with Mr. Simon, in New York.

I worked for the Navy Department for four years, or from 1913 to March 1918, and since that time I have been out in the commercial field developing radio apparatus for war purposes.

I wish to place myself on record as a man who started out fresh in life to go into a Government institution and find there the possibility of a life work. I was very enthusiastic about it the first year. I was in perhaps the most efficient military or governmental establishment that there is in the United States, the Navy—I have great respect for it. But, after the first year, I began to see that work and development were definitely and seriously limited by the dead wood of the life jobbers, the intrigue of politics, and the ever changing direction of naval officers. I was very successful and the work followed me around. Soon I was charged with the duty of determining what new things should be used by the Navy, the investigation of them to find out their possibilities. I worked in the New York Navy Yard for over three years and when the war seemed imminent I was called to Washington, where I stayed for a year. In February of this year, when the war clouds of Europe looked pretty black, I threw up the job in despair. I can tell many reasons why I did that, but to do so would occupy many hours. Perhaps one illustration will suffice.

A man came to the Navy Department with an idea that he could paralyze the magneto of aeroplanes by wireless. Eventually he was sent to me to find out whether it would work or not, and I examined

him and I found that either he was a crook or a German spy, and I so reported. My time was valuable and the organization I had around me was busy. We were trying to do things. Instead of following the recommendation that I made, an officer stepped in and to please somebody else work was done upon that fellow's idea. Time was spent on it with no result, as any engineer could have foreseen.

It has been mentioned here that the Naval Radio Department has not patented or invented anything. This is true, not because the civilians in naval employ, or the naval officers, have no ability, but because of the showy wasteful system under which they live. Their ideal is not the ideal of service to the whole country or service to any art; it is the ideal of immediate military efficiency.

After leaving the Navy I went out into the commercial field to see whether something could not be done there to improve our poor Army and Navy communication apparatus. I looked around to find a live organization. I believe I found one in Mr. Simon's; and I can safely say I have accomplished a whole lot more there than I ever could have accomplished in the Navy Department.

There were many other expert young men who had started along with me who threw up their hands in disgust and left, some joining the Army and some taking over work with commercial companies.

I would like to be questioned on any phase of this work that might interest the committee. I feel I am in a peculiar position in that before the war and during the greater part of the war I was in the employment of the Government, and then I had the opportunity of going out and being in commercial employ.

Mr. GREENE. In what line of business?

Mr. ISRAEL. Radio engineering, developing the radio art, trying to make communication better; trying to serve not only the Navy but also the Army or any other agency of the Government that this art would be valuable to.

Mr. GREENE. Where did you go, what part of the country did you go to in order to develop this?

Mr. ISRAEL. My stations were New York and Washington Navy Yard, and at times I was sent out on various battleships.

Mr. GREENE. You said you left the Navy and went into commercial life; that is what I want to get at. I understand you went into some commercial business?

Mr. ISRAEL. I went to New York where I have recently been engaged on an Army job. A real live lieutenant was sent back by Gen. Pershing to have designed and built some field radio equipment that could be used. This lieutenant had worked for several other departments of the Government besides the Army; he wanted the best, in an impossibly short time, so he came to a commercial establishment to get results, and he has got them.

Mr. BURROUGHS. How long have you been engaged on this work?

Mr. ISRAEL. Six years.

Mr. BURROUGHS. Where were you educated?

Mr. ISRAEL. In the College of the City of New York.

Mr. BURROUGHS. You graduated there?

Mr. ISRAEL. Yes, sir.

Mr. BURROUGHS. As an electrical engineer?

Mr. ISRAEL. I started off as an electrical engineer and specialized for a year on radio and then took a half year's postgraduate course.

Mr. BURROUGHS. Can you tell me and the committee whether you know of any reason, from a technical standpoint or a scientific standpoint, why this matter of interference can not be handled by regulation as well as in any other way, as well as through Government ownership?

Mr. ISRAEL. It can be handled by regulation?

Mr. BURROUGHS. Yes.

Mr. ISRAEL. I know of no reason why it can not be handled by regulation. I do not regard the problem of interference as serious. The art is in its infancy, and there are, I should say, at least ten systems which are now known which, if properly used, would eliminate the major part of the interference and what is left could be regulated out.

Mr. BURROUGHS. You say you do not think it is serious at present?

Mr. ISRAEL. No, sir—it may be serious at present, I am not familiar with the operating end; I am connected with the engineering development. But if it is serious at all it is only because of some inefficiency in the apparatus.

Mr. BURROUGHS. How would you get rid of that?

Mr. ISRAEL. My present idea is to adopt a liberal attitude toward all private enterprise and possibly all Government enterprise to invent new apparatus, and improve existing apparatus, so as to eliminate it.

When I was with the Navy I offered in one year to develop a system so that radio messages could be sent in English in a way that no outsider would be able to read them. I did not get much encouragement. I know I can do it. It would not have cost the Government more than \$50,000; but no one in that service would plan work of this nature for a whole year ahead.

The CHAIRMAN. Put it up to the Marconi Co. and probably they will regard it with more favor.

Mr. ISRAEL. I may in time. I am at present engaged on the tail end of war problems, and when the proper times comes perhaps I shall do that.

The CHAIRMAN. We shall now be glad to hear Mr. Cutting.

STATEMENT OF FULTON CUTTING, CAMBRIDGE, MASS.

Mr. CUTTING. I am connected with the Cutting & Washington Corporation, of Cambridge, Mass., which is a radio manufacturing and engineering company.

I want to just say a word or two protesting against this bill, because, in the first place, if the bill goes into effect I will close out my company. I do not care to go into a business where I only have one customer and where that customer is the United States Government. I do not consider the prospects good. If the bill does not pass I have no fear of competition with our company.

One thing perhaps has not been brought out with reference to high-power stations. I am exceedingly optimistic about the future of radio and the possibilities of accomplishment. I believe in the present state of the art it is a very serious undertaking, and if the Government goes into it either one of two things might happen.

Either it will not develop, so that the public will not get the use of it, or it will develop and it will be such a serious competitor that if they give the public the rates which the system allows it will seriously endanger the cable companies, or if they keep the rates up it will seriously injure the public, and the only way out of it is that the public might take over the cables, and that will be a good start on general Government ownership. That is all I have to say. [Laughter.]

The CHAIRMAN. Mr. Godley, we will now hear you.

**STATEMENT OF PAUL F. GODLEY, OF THE ADAMS-MORGAN CO.,
MONTCLAIR, N. J.**

Mr. GODLEY. I am a radio engineer and a member of the firm of The Adams-Morgan Co., of Montclair, N. J.

I am appearing here on behalf of the amateurs, and possibly an explanation of my failure to request a hearing at an earlier date may be in order.

In executive session last week, the Board of Directors of the Radio Co. of America, the body which I am here to represent, concluded that the amateurs as a whole would be represented to a sufficient extent and in a satisfactory manner by Mr. Maxim of the American Radio Relay League, whom the committee has heard, I believe. But it has since occurred to the board, due to the developments, that it might be of advantage, by way of clearing the atmosphere as it concerns the radio amateur, to again bring the subject before the committee for brief reconsideration.

It might be of interest to the committee, and of interest as a matter of record, for me to give the names of the executive officers and the members of the board of directors, as well as their present addresses; with the permission of the chairman, these names follow:

President, Capt. E. H. Armstrong, Inspection and Research Section, Signal Corps, Army, Radio Laboratory, Paris, France; vice president, David S. Brown, master signal electrician, Signal Corps, Radio Laboratory, Little Silver, N. J.; treasurer, Lieut. Earnest V. Amy, Engineering Section, United States Army, American Expeditionary Forces; corresponding secretary, Ensign E. J. Styles, Naval Radio for Aircraft, Bureau of Steam Engineering. Board of Directors, Lieut. Harry Sadenwater, Naval Radio for Aircraft, Bureau of Steam Engineering; Ens. Frank King, Naval Radio for Aircraft; Theophilus Johnson, jr., expert radio aide, Bureau of Steam Engineering; L. G. Pacent, consulting engineer for radio contractor; and your orator, a radio engineer, designer, and radio contractor.

The showing of the executive officers and board of directors is representative of the showing made by the membership of the club as a whole with respect to their loyalty and fitness for service as evidenced by positions held.

The Radio Club of America wishes to go on record as firmly opposed to the bill now before this committee—bill H. R. 13159—for the reasons which follow:

First, because Department of Commerce regulation as provided under the law now in effect has been entirely satisfactory to both amateur and commercial interests, and thoroughly fair to all interests concerned including those of the Navy Department.

Statements made by Commander Hooper before this committee on last Thursday in regard to the controversy between the Navy Department and the Wanamaker Co. over the interference with naval radio traffic caused by operation of the New York Wanamaker station will serve to bring out the point which I have in mind. In effect, Commander Hooper's statement was as follows:

That the naval station in the Brooklyn Navy Yard, New York, was continually interfered with by the Wanamaker station. That numerous efforts on the part of the Department of Commerce failed to clear the situation because each time determinations as to wave length and decrement were made by the Department of Commerce representatives, it was found that the station was operating on its assigned wave length and that the decrement or damping of the emitted wave was of the proper value, and that, therefore, nothing could be done about it. Now, it is the firm conviction of the members of this club that, had the Navy Department been intrusted with the control of this station, that the station would have been shut down, and a license to operate refused, notwithstanding the fact that proof was to be had—at this very time—that, not only was it possible to operate the Brooklyn yard station without interference with the Wanamaker station, but, a very simple matter, even perhaps with the apparatus then in use at the Brooklyn yard station.

In this connection and with the permission of the chairman, I wish to read a brief extract from the minutes of the hearing before this committee on bill H. R. 19350 in January, 1917—an extract from a statement of Mr. Armstrong, the president of the organization which I represent—and to be found on page 202 of the minutes of this hearing. It reads in part as follows [reading]:

My particular interest in this legislation began several months ago, when I was asked by one of the Government inspectors at the port of New York to investigate the question of interference between the Wanamaker station and the Brooklyn Navy Yard, when the Brooklyn Navy Yard was receiving signals from Arlington. Now, the conditions of that service are these: The Brooklyn Navy Yard is 2 miles from the Wanamaker station. They desire to receive signals and messages from Arlington, which is 200 miles away from the Brooklyn Navy Yard. The Arlington station operates on 2,300 meters; the Wanamaker station operates on 1,800 meters. That is a difference of wave length of 25 per cent. The power of Arlington and the power of the Wanamaker stations are of the same order. The Brooklyn Navy Yard station can not receive from Arlington while the Wanamaker station is transmitting. That is an established fact. The Government inspectors of the port of New York know that, because the Navy has complained of the interference of the Wanamaker station.

At the request of Mr. Sadenwater, I set up some of my apparatus at Columbia University, which is about 5 miles from the Wanamaker station. I had absolutely no difficulty in receiving messages from Arlington while Wanamaker's was transmitting. I could put the telephones on the table and read the messages from Arlington. In order to hear the messages from Wanamaker's you had to take the telephone up and put them on your ears and then had to wait until Arlington stopped before you could detect they were there.

In order to duplicate the conditions under which the Brooklyn naval station was working, I went over to the Lackawanna Station. The Lackawanna Station is just the same distance from Wanamaker's that the Brooklyn Navy Yard is; that is 2 miles. I took with me a set of amateur apparatus. Part of it I had purchased from amateur manufacturers and part of it I had knocked together myself, and part I had borrowed from amateurs—amateur apparatus. And I set the apparatus up at the Hoboken Station and we received messages from Arlington while the Wanamaker station was sending without the slightest interference. That was witnessed by the Government inspector, Mr. Sadenwater, and by the Marconi engineer, Mr. Elenschneider. I can not understand why the Brooklyn Navy Yard can not duplicate what I

did with amateur apparatus, because I know I can pick out at least half a dozen amateurs who can do exactly what I did. And I can guarantee to repeat that 24 hours of the day; I can guarantee that with the apparatus which I used we can receive Arlington on 2,300 meters while Wanamaker's is working and never miss a dot.

What, beyond a possibility of a doubt, might have happened in the case of the Wanamaker station under the conditions just outlined, were the Navy Department in control, would most certainly happen to any amateur who, no matter how strictly he might hold himself to the provisions of the law, and no matter how conscientious he might be in carrying out the letter and spirit of that law, might find himself the victim of circumstances such as these.

The point is, that the amateur would rest much easier, feel a decidedly greater sense of security, were the regulation, as it applied to him, allowed to rest in the hands of the Department of Commerce, because experience has shown that that department can and does give him a square deal, and that his representations to the Department of Commerce are given the same careful and just consideration as is given to the representations of the commercial companies or the Navy Department.

I do not wish to insinuate that the officers or the enlisted men of the Navy Department would deliberately give the amateurs other than a square deal, but even the experiences of the past few weeks, to wit, the framing of a bill by Navy people which entirely overlooked the amateur and gave him no place in the scheme of things radio, is very decided evidence that he is not given much consideration by the men of the Navy; because, perhaps, their entire attention is (and it should be) given to things military. I wish here to bring out the point that the amateur as a body has no quarrel with the Navy Department. Without the possibility of a doubt amateurs as a whole have a high regard and great respect for the ability and accomplishments of the Navy personnel.

It has been brought out before this committee that the Navy is very seriously concerned over the possibility of interference from the amateur, and the amateur in turn is very seriously concerned over the possibilities of another kind of interference from the Navy, namely, interference by legislation, and they—the amateurs—have yet to hear a convincing argument as to why it is necessary or desirable from the standpoint of anyone concerned for the Navy to control the regulation of the amateur.

Second, will you please consider the subject from the standpoint of the inventor? Whether he knows it or not, every serious amateur is potentially and at heart an inventor, and I wish to call your particular attention to the fact that the possibilities of development tending toward the improvement of the art from this direction are not to be passed over lightly. As an inventor, it is decidedly to his interest to do everything in his power to prevent the monopoly of radio by the Navy, as has already been brought out before this committee, both at the present hearing and previously.

Third, every amateur is, or is potentially, a thorough-going, energetic citizen, willing and ready to bear the burdens of full citizenship, and as such and as one with whom radio is a hobby, takes particular interest in the quality of the service and the state of development of radio as it is actually applied to the branches of the military

service on which he depends to protect his citizenship. He is firmly anchored in his beliefs that continual changes should be taking place in the radio equipment employed by these military arms to the end that absolutely the best, and nothing but the best, be at all times available and in service ready for emergency.

Were the Navy to take over and operate the radio systems of the country as a commercial proposition, on the grounds that it will effect a great economy and a conservation of effort and resources, he most seriously, gentlemen, asks this question: "Is it not most likely that the Navy Department in its effort to bring credit to itself for an economic administration of commercial radio traffic, yield to temptation, and in so doing seriously neglect development in efficiency of equipment, and is not this apt to lead to a serious situation in times of national peril?"

Should this bill, against the wishes of the amateur, be passed in any form, the Radio Club of America wishes to recommend that its passage be in such form as to include in detail the following points:

That all amateur stations be licensed to transmit, only when the operator, upon examination, is found to be able to effect transmission and reception of messages at the rate of 60 letters per minute, Continental Morse Code.

That all receiving stations be licensed, but that no operator's license be required for the operation of a receiving station.

That amateur transmitting stations be restricted to wave lengths of 250 meters and below, except in cases where operation above these wave lengths will not interfere with handling of commercial and naval radio traffic, and where good cause for the operation at longer wave lengths can be shown.

That, excepting within a radius of 5 miles of a naval receiving station no geographical limitation be placed upon the power used by the amateur transmitting station.

That the power restrictions governing amateur radio transmitting stations be allowed to remain as defined by "The Act to Regulate Radio Communication" of 1912, pending a national conference of amateur radio organizations, which may be called to take place in the near future, and at which the Navy Department and possibly the commercial interests should be represented, this conference to be called for the purpose of launching a policy with regard to amateur radio activities, satisfactory to the Navy, commercial and amateur interests alike.

The CHAIRMAN. Mr. Vreeland, if you would like to be heard, we will hear you.

STATEMENT OF MR. FREDERICK K. VREELAND, MONTCLAIR, N. J.

Mr. VREELAND. My residence is Montclair, N. J., and occupation is research in electro physics.

I feel very hesitant in coming before you at this late hour when your patience is already sorely tried. My only excuse in doing so is that I represent a viewpoint that has not been presented to the committee thus far, and that is the viewpoint of the inventor and worker in developing the art. If you care to have that viewpoint presented, I shall be glad to do it very briefly.

I am not much interested in the operating end of radio telegraphy. My sphere is in the laboratory, and my work consists in learning what I can of the secrets of nature and trying to apply them to some useful purpose in the progress of the art. I am interested in this bill, because I think it provides the means of greatly stimulating the progress of research in the development of the art.

In order to explain why I feel thus, let me outline very briefly the situation that confronts the inventor. I have felt for many years that a monopoly in the operation of radio telegraphy was inevitable. I feel to-day that it is right at hand. It has been very frankly admitted that the monopoly exists already in the ship-to-shore field, and I think the danger of monopoly is even greater in the long-distance field, because of the greater expenditures involved and because of the more complex patents situation.

The reasons for the monopoly are not only the physical limitations, that have been very fully pointed out, arising from the use of just one medium of communication, but are found more particularly in the very complex patent situation.

It should be clearly borne in mind that radio telegraphy is not the work for any one man, but of a great many men.

Mr. Marconi was the first to make radio telegraphy a practical success. I give him all honor for that. But his early apparatus went into the scrap heap long ago, and the apparatus that we have to-day is the work of a great many contributors all over the world. Each one of those workers has taken out patents. Those patents overlap and interlace, in a manner that is well-nigh hopeless. If it be left to the courts to straighten out the tangle, I think I am safe in saying that many of the devices would become obsolete before the matter could be settled.

The consequence is that the only way to carry on successfully radio telegraphy is to have the patent rights acquired by some concern which is rich enough to buy them, or which is strong enough to snap its fingers at the inventor and let him spend his energies, if he will, in litigation.

That situation, I think, is unavoidable. Nobody to-day can operate a practical radio station without infringing a number of patents owned by scattered individuals or concerns, and the worst of it is that it is very difficult to know just whom you are infringing. The only way I can see to straighten out the tangle is to cut the Gordian knot and so perform a great service in the development of the art.

So much for the present and past situation.

As to the future, I think that if the control of radio were put in the hands of the Navy Department, instead of in the hands of a private monopoly having only its self-interest to serve, it would greatly stimulate research and invention, because it would offer to the worker a reasonable hope of receiving a fair reward for his work.

You know, gentlemen, that inventions in this art are not made by a man sitting in a dark room knitting his brows, and then emerging with an invention full fledged. In nearly every case they are worked out by a long process of painstaking research.

That research costs money and it costs time. The research worker is usually poor. He is almost always a poor business man, and

when he has produced something useful, the only chance of reward that he has is through a patent.

When he gets a patent, in the present situation, it is very difficult for him to realize on it, unless he is willing to spend great sums in litigation. And, furthermore, he falls an easy prey to the promoter representing various interests, who usually get the lion's share of the bargain.

Both of these difficulties could be cleared away, I believe, in the way that has already been outlined by Commander Hooper. I believe that if the Navy Department were given a free hand in this art, they would be able, by means of such a committee or board of patent investigation as has been proposed, to offer to the inventor a reasonable prospect of putting his invention into practice and receiving such reward as will enable him to go on and make new inventions.

I do not mean by this that the Navy Department itself should take up the technical development of the art; I do not understand that they have any intention of doing so. But, by gathering under one head the various interests involved, and giving the inventor a reasonable opportunity to present his claim, and if it were found worth while and the means for putting it into operation were provided, a very great service would be performed.

There is one point on which I differ from the suggestion of Commander Hooper, and that is as to the manner in which agreements that might be reached between the inventor and such a commission should be adjusted. I think it would be very unfortunate if this matter were thrown back into the Court of Claims.

Mr. GREENE. I was going to suggest that that seemed to be the idea on behalf of the Navy, to go to the Court of Claims; and they would probably be as white haired as I am before they would get a decision. [Laughter.]

Mr. VREELAND. That is precisely my point, Mr. Greene. I wish some adjustment might be reached whereby such agreements as might be entered into between the inventor and the patent board might be carried out and the inventor get his just dues in a reasonable time, without having recourse to the Court of Claims.

Mr. EDMONDS. If a patent is purchased by the Navy Department, to whom does it belong?

Mr. VREELAND. I am not a patent lawyer, sir. Mr. Dyer can answer that question much better than I can.

Mr. EDMONDS. Would it be your idea that a patent bought by the Navy Department would become public property and anybody could use it?

Mr. VREELAND. I am not informed on that point.

Mr. EDMONDS. Well, it is only a question of whether the public money should be used for the purpose of procuring a patent which anybody could use, because I do not think anybody in the Navy ought to own it.

Mr. VREELAND. Mr. Dyer, who will follow me, has had wide experience in patent law, and I think he can answer that question.

Mr. EDMONDS. All right; I will ask him.

Mr. VREELAND. And I think, furthermore, that a Government monopoly would not mean, in any sense, a monopoly of manufacture. On the contrary, I think if the Government had control of the patent

rights it would throw the manufacturing field open free to all, for normal, healthy, competitive manufacturing.

Mr. EDMONDS. You answered my question right there, then.

Mr. VREELAND. I thought you referred to the legal question; and my point is—

Mr. EDMONDS (interposing). You said if the Government controlled the patent, it would throw the manufacturing open to everybody.

Mr. VREELAND. For this reason: That they would all be manufacturing for the Navy Department, which would be the owner of the patents. A manufacture has a perfect right to manufacture for a patentee, or the owner of a patent, who orders the articles from him. Therefore, I say the Navy Department can order from anybody it pleases, and he will be free to manufacture without infringing any patent rights, if the Navy Department owns the patent rights.

Mr. EDMONDS. You mean that any manufacturer making the article for the Government, which owned the patent, could not patentee may lose his rights.

Mr. VREELAND. Yes, sir. You see that is quite a different matter from the question as to whether ownership by the Navy Department would make the patent public property.

Mr. EDMONDS. Yes, that is quite different from what I was asking about.

Mr. VREELAND. Yes, I see.

Mr. GREENE. Well, it would be a sort of autocracy—the thing that we are trying to get rid of.

The CHAIRMAN. No, his idea is that if the Government owned the patents, the Government could then let out the manufacture of the patented articles to as many different agencies as it desired.

Mr. GREENE. Well, that is all theoretical.

The CHAIRMAN. Well, any patentee can do that, can he not?

Mr. VREELAND. Can do what?

The CHAIRMAN. Let anybody he chooses manufacture the article of which he controls the patent.

Mr. VREELAND. Yes, sir; but if the patents are controlled by private interests, the private interests which control the patents are not likely to do that; they are likely to keep the rights to themselves.

Mr. GREENE. Well, they have the opportunity which should be given to every American citizen to try to earn a dollar.

Mr. EDMONDS. When he gets a patent, the Government guarantees him a monopoly of it for 17 years, and if he can not exercise that monopoly he is deprived of his rights under the law.

Mr. GREENE. Well, if we turn it over to the Navy Department, the patentee may lose his rights.

Mr. EDMONDS. Yes, they might abolish the patent laws as to inventions in this art.

The CHAIRMAN. I do not think you understand what the witness meant: I do not think he has that in view.

Mr. GREENE. I do not know what he meant; I know what he said.

The CHAIRMAN. Well, it is very clear to my mind what he meant.

Mr. VREELAND. But that is an incidental point, to my mind. The main point I want to make is that, from the viewpoint of the development of the art, I think that the control of the situation by the Navy Department, rather than by private monopoly, which I think

is otherwise inevitable, would greatly aid in the development of the art by stimulating workers to put forth their best efforts.

Mr. GREENE. Well, you had better get elected to Congress, and come here and try to put a bill through in that way. [Laughter.]

Mr. BURROUGHS. Did I understand correctly that you had sold out any patents yourself?

Mr. VREELAND. I have not sold any outright; I have sold some devices under license.

Mr. BURROUGHS. To whom?

Mr. VREELAND. The Government is using several of my devices; they are paying a nominal royalty, or license fee, pending adjustment after the war. Being a patriotic citizen, I thought it my duty not to press the Government for an adjustment during the war; that adjustment is pending; they are simply paying a nominal fee at present.

Mr. EDMONDS. Are other companies using your devices?

Mr. VREELAND. Yes, sir. Nearly every high-power receiving station in the world is using a device covered by one of my patents, and thousands of minor stations in addition.

Mr. EDMONDS. And they are not paying you?

Mr. VREELAND. The Government is the only one that is paying me a cent.

The CHAIRMAN. Have you anything further to submit, Mr. Vreeland.

Mr. VREELAND. No, sir; I am through.

The CHAIRMAN. Mr. Dyer, we will hear you briefly now.

STATEMENT OF MR. FRANK L. DYER, MONTCLAIR, N. J.

Mr. DYER. Mr. Chairman and gentlemen: I practiced for a good many years as a patent lawyer but am now retired.

For many of those years I was intimately associated with Mr. Edison, at Orange, N. J., and was general counsel for Mr. Edison and the various Edison companies from 1897 to 1912; and for a number of years I was the president of the various Edison concerns at Orange. I am in the manufacturing business independently at the present time. I am also an inventor myself and for many years have been very much interested in inventions and inventors.

I hope that I can say, in a few words, something that has not as yet been said to the committee, first, in reference to the patent situation in this art that I think the Navy Department was confronted with; and second, with regard to my own experience and my own knowledge of the extent to which inventions have been developed and are being developed by the Navy Department.

In expressing any opinions as to patents, I am doing so largely from memory, because when I came down here I did not expect to address the committee.

But it has been very obvious to me, Mr. Chairman, that the committee has not been informed correctly as to the patent situation, even to the remotest extent.

I will take a device in which I am personally interested, with Mr. Vreeland, merely as an example of the point I wish to make. And that is the modern high power receiving apparatus, employing un-

damped waves, used in these stations that you have been told about during the hearings on this bill. And I will tell you how that device was developed, and who contributed to its development; what patents cover it; and who owns those patents, so that you may see how tremendously complicated the whole patent situation is, and how obviously impossible it would have been for the Navy Department, confronted with that patent situation, to attempt to decide the questions presented to it. But I want to repeat, Mr. Chairman, that I am relying entirely upon my memory as to the patents, and my purpose is not so much to discuss the scope and bearing of particular patents as it is to illustrate the difficulties of the situation.

The modern high power receiver using undamped waves involves, in the first place, as I am informed, an arrangement invented by Marconi, known as four-circuit tuning, the patent on which is owned by the Marconi Co. I cordially indorse, of course, all that Mr. Vreeland has said concerning Mr. Marconi; he stands as the great shining light of this art. And I know, from my own association with Mr. Edison, that he also looks upon Mr. Marconi as one of the world's great inventors. Thus, at the very start, we find that every receiving apparatus using the undamped wave infringes this four-circuit tuning patent owned by the Marconi Co.

The second patent involved in this apparatus is the so-called undamped wave patent of Fessenden, owned by the International Co. I do not know whether that patent has been sustained or not; my recollection is not clear as to that.

In the third place, these undamped wave receivers utilize the so-called heterodyne system; that is to say, the oscillations generated in the antenna of a certain frequency have superimposed upon them oscillations of a slightly different frequency, so that beats are secured, which are heard as an audible note in the telephone. But the heterodyne receiver, invented by Fessenden, was not the perfected device of modern times; it was a very crude arrangement that occupied very much the same relation to the modern art that the original Bell telephone did to the perfected art of telephony. The Bell telephone as a commercial device was made possible by the later invention of Berliner, but Prof. Bell discovered the broad principle and he was, therefore, entitled to the patent, by which the Bell Co. dominated the telephone field until 1898. The heterodyne receiver, as developed by Fessenden, was a device in which the oscillations in the antenna circulated in one coil of a so-called dynamometer telephone and the oscillations of slightly different frequency circulated in the second coil of the dynamometer telephone. But that showed the principle. Mr. Fessenden also stands very high in the wireless art. He was an experimenter with Mr. Edison at one time. All modern receivers using the undamped wave involve the heterodyne principle.

The fourth step in the development of the undamped wave receiver was made by Mr. Vreeland away back in 1907. Mr. Vreeland was the man who first combined in one and the same circuit the effect of the oscillations in the antenna circuit and the oscillations of slightly different frequency generated in the local circuit, so as to obtain in this way electrical beats as distinguished from magnetic beats, as proposed by Fessenden. Those electric beats could be detected by extremely delicate detectors, and thus the sensitiveness of

the receiver was increased, making it possible to transmit signals over a long distance. Thus, this invention of Mr. Vreeland's was a further advance in the art.

The fifth step was also made by Mr. Vreeland, and that was the discovery that the beat current generated by the interaction of the two sets of oscillations of slightly different frequencies could be rectified by means of a rectifying detector, making it possible to use a magnetic telephone as a receiver and further increasing the sensitiveness of the device. That was the fifth step; and all of these undamped wave receivers embody that invention.

The sixth step goes back again to the Marconi Co. They have a patent on a device called the "Fleming valve," which was the forerunner of the modern audion, and all of these undamped wave receivers employ this invention as a special kind of detector to permit the highest practical results to be secured.

The seventh step was the use of the De Forest audion, a special refinement of the Fleming valve, the patent on which is owned by the De Forest Co. Audions are used in all undamped wave receivers to secure a further measure of sensitiveness.

And the eighth and final step, so far as I know, was the so-called regenerative audion invented by Mr. Armstrong and covered by his patent, by which the effect at the receiver will be greatly magnified, or in other words, by which a further degree of sensitiveness to the apparatus will be secured.

So that we have in this one apparatus, which is not much larger than a small music box, eight separate patents, all of which are used, and all the result of the work of different inventors; and owned, respectively, by the Marconi Co., International Co., Mr. Vreeland, De Forest, and Armstrong.

Now, it is perfectly understandable to me, Mr. Chairman, how greatly mystified the Navy Department must have been in the face of this situation. Naval officers are not patent lawyers; I doubt very much if they know what patents are. They were waited upon by the Marconi Co., who said "You infringe our patents." They were waited upon by the International Co., who said "You infringe our patents." They were waited upon by us, and we said "You infringe our patents." The De Forest and Armstrong people also waited upon them, and said "You infringe our patents." And they did; they infringed the patents of all five of those interests.

So that the situation, as Mr. Vreeland has said, was so intricate, so absolutely and utterly intricate, that I do not see how it possibly could have been straightened out.

It became intricate largely because of the peculiar situation underlying this art when it had its inception; and that was, that we all thought that wireless had a much greater field than it turned out to have. It was looked upon as a very wonderful thing, an improvement on the cables, a probable substitute for cables. Naturally, very many men entered the field and began to do experimental work and make inventions, for which a very great number of patents were secured. To mention only two names, I believe that Mr. Fessenden has secured upward of 100 patents and Mr. Shoemaker has obtained, perhaps 60 patents. So that in this small art, which does not amount to very much, we have an unusually large number of patents. Consequently when a device is finally perfected, it is found to embody

not the patents and inventions of one man, but generally the patents and inventions of a large number of men. When I say that the art is small, I mean that it does not amount to very much compared to many other industries, such as the talking machine business for example. I doubt if the entire value of the entire wireless industry in this country, including all the naval stations, all the privately owned commercial stations, all the amateur stations, and all the factories employed for manufacturing wireless apparatus, is as large as a single year's output, for instance, of the Victor Talking Machine Co., to mention only one concern of many engaged in the phonograph business.

I want to say a word also as to what I know about what the Navy has done in the development of inventions within my own experience or knowledge. Of course, we all know the extent to which armor-plate has been developed by the steel companies in cooperation with the Navy. I know, myself, through professional connections, that the E. W. Bliss Co., of Brooklyn, N. Y., cooperating with the Navy Department, has been able to increase the range of the automobile torpedo in 20 years from 2,000 yards to 8,000 yards. The public prints tell us of the magnificent work of the Navy Department, cooperating with the General Electric Co., in the development of the electric drive for battleships, and I have no doubt that many hundreds of other inventions have been developed in the same way. I know that the Navy Department has cooperated with the Sperry Co., Mr. Sperry being a personal friend of mine, in the development of the gyroscopic compass, range finders, and other special types of apparatus used in the Navy. I know that the Navy Department has cooperated with the Western Electric Co. in the development of inventions. Admiral Fiske was at one time a client of mine; he is an inventor of prominence and I know that through his cooperation with the Western Electric Co., a great deal of experimental development was done for the Navy's use. So that I think the gentlemen who are opposing the bill on the ground that the Navy Department will not develop inventions are probably of the belief that the development is to be undertaken by the department alone and they may not be aware of the fact that the practice of the Navy is to develop inventions in cooperation with the large concerns, to which I have referred, and whose facilities for the purpose are the finest in the world.

Before closing I want to refer to the question put by Mr. Edmonds to Mr. Vreeland, namely, whether the assignment of a patent to the United States does not in fact open the monopoly to any one. I am frank to say that I know of no case where that question has ever been judiciously answered. But I should say that since the United States Government has the unquestioned right of ownership in property generally, I can see no reason why its right of ownership should not extend to the particular kind of property that is represented by a patent, with all the rights that go with it, including the right to prevent infringements of its property, just as it may prevent trespass on its lands, wharves, docks, and buildings. If it is the desire of the patentee to give the public the right to unrestricted use of the patent, that is done, not by assignment to the Government, but by a dedication to the public. This has been done in a number of instances where patentees have been sufficiently influenced by mo-

tives of altruism and public spirit to forego their own possible profit for the general good.

I thank you very much for hearing me.

The CHAIRMAN. Capt. Todd, the committee will now hear you.

ADDITIONAL STATEMENT OF CAPT. D. W. TODD, DIRECTOR NAVAL COMMUNICATIONS.

Capt. Todd. I have not much to say, Mr. Chairman; I can finish what I have to say in 10 minutes.

There are a few points in connection with the bill that have been covered in a way which might leave a false impression in the minds of the committee. I do not want to go into details, but to bring out the principal points.

I will follow the division of the different kinds of stations that have been made by some of the witnesses—the amateur station, the ship-to-shore station, and the high-power station.

In the first place, the bill has nothing to do with patents, about which you have heard a great deal. It has nothing to do with manufacturing in itself. If there is anything in the bill that seems to indicate that a manufacturer may not test his apparatus to the limit, that means that there is a defect in the bill which should be corrected.

The bill has nothing to do with development. The market would be just the same as it is at present, unless there is a possibility of a vast multiplicity of stations. At the present time we have reached our practical limit of ship-to-shore stations and are close to the limit for high-power stations.

The number of high-power stations needed by commerce and by the Government increases faster than the art. Of course, without this proposed legislation, should there be a multiplicity of stations, there would be more opportunity for the manufacturers to sell their wares. Present indications are that there can be no multiplicity of stations for overland or overseas work.

The Navy must continue to buy new sets for the shore stations, so as to keep up to date all the time. The Navy must still buy sets for its ships and keep replacing them as the art advances.

The merchant marine must still have its sets. The amateur must still get parts of sets and put them together, and have his home station.

As to the amateurs, I am glad they have been stirred up about the bill, because it has helped them to clear their own minds and has taught all of us how very difficult it would be for them to agree among themselves—extremely difficult.

I have been told that they have tried since these hearings to get together, with very poor success.

Mr. GREENE. May I say a word just there? There was only a limited number of amateurs here, and of course you could not expect these men to undertake to agree for men whom they could not confer with, unless they had had a wireless apparatus available, so that they could confer with them. They were not able to confer with the large number of amateurs who did not come here; they had a few men representing them here, and there was some difference of opinion among them.

But from the men that I have been conversing with, I did not find any great lack of unanimity or agreement on the bill. They were

largely against it, and some of them very fiercely against it; and some of them went away because they had it explained to them, so that they were satisfied; others that had not had it explained were not very well satisfied; and then, after they had had it explained, they were not very well satisfied; and then they said that they could not undertake to subscribe to an agreement without conferring with some of the vast number of men engaged in the radio art; it would have been ridiculous for them to have undertaken to bind other people without conferring with them; they could not do it.

Capt. TODD. The point I was trying to bring out is, that it is just as well that we did not try in the beginning to incorporate in this bill anything that would please the entire number of amateurs; but I have every confidence that the great majority of them will be satisfied with the provisions of any bill which will be acceptable to your committee, as any such bill will surely recognize them and their needs.

Mr. GREENE. They do not know what this committee is going to do, and we do not ourselves know what it is going to do; it has not been decided yet what this committee will do.

Capt. TODD. From the earnestness with which the amateurs talked, I think it probable that you will pay considerable attention to them.

The second lot of stations is the ship-to-shore stations. The present status is that there are only five of those, if I am not mistaken, within the continental limits of the United States that we do not own. Of those five, the owner of two only have appeared here, the United Fruit Co. The owners of the others have not opposed the bill.

The CHAIRMAN. Who owns the other three stations?

Capt. TODD. The International Radio Co.

Mr. GREENE. Have you not bought any part of their apparatus?

Capt. TODD. No; not that in their stations. It is not for sale—except their patents.

Mr. GREENE. You have bought their patents?

Capt. TODD. No, sir. I do not know about patents, but I do know that they are trying to sell their patents to the Navy Department.

The ship-to-shore station business, then, is practically in the hands of the Navy, and I am thoroughly convinced that it will continue to be so, because there is not enough money in it for private interests; we have maintained that again and again, and we believe it more every time we say it.

There is one point about ship-to-shore work that has not been clearly brought out: That is, that the ship-to-shore work is conducted according to an international agreement and covered by the international convention signed in London in 1912. The act of 1912 was originally based on the Berlin convention. It was the hope at that time that the United States would ratify the Berlin convention and join the great family of nations in getting the most effective regulations for doing the ship-to-shore work, so that the needs of commerce would be served, no matter what coast a ship might be on, and life at sea might be safe.

Before Congress passed that bill the provisions of the London conference were cabled over here; so that any changes from the Berlin convention might be incorporated in the bill.

All of this talk about operating on one or two wave lengths—300 or 600—is beside the question, since, by the ratification of the London convention, it became the law of the land, and must await a

coming international conference, which was scheduled for Washington last year and will follow the treaty of peace in about a year, undoubtedly. Of course it is quite possible for one nation to denounce the convention, and then after a space of time, leave the society of other nations and handle radio the way it pleases; but that is not practicable.

I will just touch on the question of interference: Considering all of the sad things that have been said about the inefficiency of naval operators and the tendency of naval officers to reach out, perhaps I am taking a chance in saying that I have had the administration of cable censorship, in addition to my duties in connection with radio communication. There is one cablegram that passed through our hands that saved the Government \$7,000,000. That paid for all the expenses of the censorship for the entire war many, many times over. And it justified the cable censorship in itself.

In addition to that there is no way of telling how many schemes of German agents and enemy plans were upset by the cable censorship. That is a very intangible thing, and we will never know just how many transports and cargo ships we have saved from enemy submarines. We know that we did accomplish some very interesting things.

The thought I am trying to bring out is this: If you do not pass some legislation which will make ship-to-shore work safer by putting further limits on amateur operation, which become necessary on account of the increased efficiency of apparatus and the advance of the art; and if you do not concentrate in one authority the operation of all coast stations and take care of the question of interference in every way possible there is always the chance of the station which is trying to save life at sea being interfered with. There is always that chance; and the loss of a single ship, with her cargo and her crew, due to some cause that was not unavoidable, some point which might have been covered by legislation—even that alone would be a justification for some action by Congress in this matter. Some immediate congressional action is also necessary in the line of licensing all receiving stations, otherwise all radio traffic will continue to be public property.

The Navy Department has been, possibly, a little on the defensive before this committee. It should be understood that it is the duty of somebody to advise the Government on all matters connected with it. The department of the Government which should advise Congress, or the Government generally, on radio matters is that department which has the greatest operating experience. It is not the Patent Office that should do it; it is not the department that licenses stations; nor is it the Post Office Department, which is interested in communications in general. The department to which radio communication is a very practical thing, a vital necessity, and which has, from the very nature of things, an interest in progress in the art and knows most about it, should be the department whose opinion should be most valuable in framing new legislation, and may be expected to be first in sounding an alarm when new legislation is necessary.

With regard to high-power stations, I will say that there are, outside of those owned by the Government and those on United States soil, only three high-power stations in the world. Two of them are British Marconi, and one of them is Canadian Marconi.

On our own soil, we have five high-power stations. Four of them are Marconi stations and one is Tuckerton. Of the three high-power stations that are not on American soil, two are the original Marconi high-power stations, Clifden and Glace Bay, with apparatus that I am sure even the Marconi Co. admits is obsolete; in fact, they have said it was obsolete, and they have said it was withdrawn from their latest stations, New Brunswick and Marion, and replaced by later apparatus, which they call the "time spark." The efficiency of that, as compared with the continuous wave apparatus which the Navy Department has been using for some time—under patents which we have purchased, so that we would be sure to have it without any argument—all radio engineers would say that any comparison between the time-spark apparatus and the Navy apparatus would be very much in favor of the naval apparatus, and that the other is out of date already, before it has had a good chance to do any real work.

On the Pacific coast, however, between Honolulu and the California coast, those Marconi stations have apparatus earlier than the "time spark," similar to those of the original stations I spoke of, which is very much out of date; and when they operate, they disrupt not only all the stations receiving on the island of Oahu, but the station on the California coast sometimes stops high-power communication along the entire coast.

That is the high-power transmitter which some witness has said had been removed from New Brunswick and from Marion as being obsolete; they are still in operation on the Pacific coast, or would be if we had not silenced them for a while. The act of 1912 does not cover their case. All United States high-power stations use American-developed and American-built transmitters, except Marconi, which uses English type and English-built transmitters.

I was sorry to hear a gentleman representing the Chamber of Commerce of Honolulu oppose this bill, because we need absolute control in the Hawaiian Islands. They are our key to the Pacific; their strategic value can not be overestimated; and there is nothing more abhorrent to our ideas than to find three high-power stations on one little island in the Pacific Ocean, especially when one of them is equipped, confessedly, with an out-of-date transmitter. If we should obtain the Kahuku Station, we should probably not operate that station at all with its present outfit. We could handle much more work without it than with it.

Of course, the answer is that other people could make it work; and the gentleman from Honolulu says there is no such thing as interference there, because he gets his dispatches there every day. The business of the entire Hawaiian Islands is small, and the two high-power circuits, plus the cable service, can handle all the business naturally in a day; and the radio business certainly can be handled by two stations keeping quiet while the other is working, taking turns, in other words. That is not a proper use of facilities; that is exactly what we wish to avoid by putting all of these stations under one control, and by keeping all stations equipped with apparatus combining power and efficiency.

As to the shutting off of private messages, that was entirely dependent upon the congested conditions, and we relieved the situation as much as we could by handling Government business by high-power stations. The messages they would send could be read in

Germany, which would have been a very great menace; and that had to be stopped. By agreement of all the departments interested, we had to do that. As a result there was further congestion on the Pacific cable, which had its traffic enormously increased on account of the war. The shutting down of private messages was an absolute necessity and not an arbitrary Government measure.

There is one final thing I should like to say about the next international conference. I have shown you how few high-power stations there are that are not Government controlled. Norway, Italy, France, Japan, and Germany all have their high-power stations in their own hands. No other nation has any high-power stations except Great Britain and ourselves. I have no doubt but that the next international conference will internationalize all high-power stations; and it would be a wonderful thing if, by the passage of this bill, we could be in a strong position for that conference, by being prepared in advance with stations equal or superior in equipment to any in the world; and I want to say very emphatically that one of the most important things which must in time be accomplished by a bill similar to this will be the absolute prevention of the building of foreign-owned or foreign-controlled stations on American territory anywhere for the extension of foreign systems to our shores. Since it has been shown in the past that this thing is possible, that it has been done, it should be absolutely and positively prevented for the future.

I thank you, gentlemen.

Mr. NALLY. Mr. Chairman, may I have just one minute to make a statement?

The CHAIRMAN. Is there anybody else to be heard on behalf of the Navy Department?

Capt. TODD. No, sir.

The CHAIRMAN. Then you may make your brief statement now, Mr. Nally.

**ADDITIONAL STATEMENT OF MR. E. J. NALLY, VICE PRESIDENT
AND GENERAL MANAGER MARCONI WIRELESS TELEGRAPH
& TELEPHONE CO.**

Mr. NALLY. I merely wanted to ask, first, if Messrs. Vreeland and Dyer would not, in the interest of truth, change their testimony and relieve the Marconi Co. of the charge of infringing the heterodyne and the Vreeland improvements? Because we do not use the undamped wave; we use the damped wave, and consequently we have not utilized the heterodyne improvement, and therefore have not utilized the Vreeland improvement.

I also want to say, in passing, that while I will not argue with Capt. Todd that the equipment of the Japanese Marconi circuit is the latest thing, yet it is true that it is doing to-day very, very effective work, or was up to the time the Navy took it over; and we think, in the hands of our trained men it could continue to do very effective work. We think if we could continue to work it now we could very greatly relieve the present congestion on the Pacific coast, where it now takes seven days to send a message to Japan.

Mr. DYER. Mr. Chairman, in reference to Mr. Nally's statement. I made no charge of infringement in my statement. I merely attempted to explain what patents were used in the apparatus which I referred to as the modern high-power receiver with undamped waves. Of

course, if the Marconi Co. does not use that, then it does not infringe the patents.

MR. GREENE. Mr. Chairman, I have a number of letters and a number of documents that have been sent to me in connection with this hearing that I should like to have inserted in the record.

THE CHAIRMAN. Very well; we can go over them later and have them inserted.

Representative LUFKIN. Mr. Chairman and members of the committee, I am not here to either favor or oppose this bill. I am not familiar enough with the details of the proposed legislation to do this at the present time. But I do want to call the attention of the committee to the views of the thousands of amateur radio operators in this country as expressed in a very interesting and remarkable letter which I have just received from a boy residing in my congressional district, who is one of these amateurs.

I ask permission of the committee to print his letter in the records of the hearings:

[Copy.]

ESSEX, MASS., December 9, 1918.

Congressman W. W. LUFKIN.

House of Representatives, Washington, D. C.

DEAR SIR: As a radio amateur I am writing you a protest against the Alexander bill (H. R. 13159), which may prohibit amateur wireless. I understand that this bill provides that the Navy shall take over all radio stations, and it entirely ignores the amateur. This means that we will not be allowed to operate our stations again.

I wish to bring out some of the points in favor of the amateur. When the United States entered the war the Army and Navy were in great need of trained operators. The result was that thousands of our best radio amateurs enlisted their services for our United States. Most of these men needed but little training in radio to assume active duty. It would have been impossible for the Army or the Navy to train men in the short time that they would be required for active duty.

There are at present many former radio amateurs in the service of our country. When they are discharged from the service they will want to reopen their radio stations. If they can not, do you think they will think the same of our Government as they did before we entered the war?

The present high stage of development of radio communication is largely due to discoveries made by radio amateurs. One of the greatest of these is the regenerative receiver invented by Edwin H. Armstrong, now captain in the United States Army. This system is used in every naval station of the United States, and has more than doubled the distance over which a station can operate. Another great invention is that of the wireless controlled torpedo, by John Hays Hammond, jr. The Navy recently purchased his invention. At the time it was being tested and developed Mr. Hammond was an amateur.

Many high governmental positions are now held by men who were radio amateurs before the war. Many of the amateur stations have cost the owners a considerable sum of money. If we are closed up for good, what are we to do with our apparatus, which we worked hard to get? Probably the Government would not care to purchase our apparatus, because theirs is designed in various units, so that stations for the same system will be alike in construction and operation.

Perhaps you remember it was due to an amateur that spies were detected at Sayville, N. Y., and Tuckerton, N. J., stations that transmitted messages to Germany before we entered the war. This amateur recorded these messages on phonograph records, which he handed over to the United States authorities, and they found that they were not like the messages which were passed by the United States censor.

Naval radio experts will admit that amateur radio telegraphy can be carried on without interfering with naval stations. Before we entered the war, the amateurs formed a relay league, and by our organization we were able to trans-

init messages from coast to coast or from the Gulf to the Canadian boundary without interfering with stations operated by the Government.

The amateurs have saved towns and cities threatened by fire and floods when all other telegraphic communications were cut off from the outside world. The amateurs always tried to obey the laws of radio communication of the United States. In case there were some that were ignorant of the law, they were informed by the more advanced amateurs. These are only a few of the reasons why the amateur should be allowed to reopen his station. I think that action on this bill should be delayed until such time as the radio amateurs who are now in the service of their country—and some do not even know of the existence of the bill—shall have been given an opportunity to be heard.

Trusting that you will do all in your power in the cause of the amateurs of the United States, I remain,

Very truly, yours,

CARL G. RICKER.

The CHAIRMAN. Gentlemen, the hearings are now closed.
(Thereupon, at 6 o'clock p. m., the committee adjourned.)

APPENDIX.

(The chairman submitted the following letters from the executive departments of the Government for the record:)

DEPARTMENT OF COMMERCE, OFFICE OF THE SECRETARY.

Washington, December 10, 1918.

SIR: I have received your letter of the 4th instant, inclosing a copy of bill H. R. 13149 to further regulate radio communication, and requesting that I give your committee my views as to whether or not it would be advisable to enact the same into law. You state that the public hearings on the bill are to commence on the 12th instant, and you state that you would like to have my views on the bill by that time.

In reply, it appears to me that the essential features of the bill are:

1. The purchase by the Government of all coast commercial radio telegraphic stations and permanent Government ownership (secs. 2, 8).

2. The permanent operation by the Navy Department of all commercial-coast radio stations (sec. 9) involving permanent naval control of all commercial-radio communication between the land and ships at sea as well as control of communication between the United States and other countries through Government ownership and operation of high-powered stations at American terminals.

3. The prohibition of private or corporate-radio activities (sec. 3).

This department regards Government ownership and operation of commercial-radio service as necessary and inevitable and is convinced that one department of the Government should have full control of the entire matter except as it may delegate to other departments minor fields of control and operation. The Commerce Department, I think, has done fairly well in carrying out in ordinary times of peace the purposes of Congress in establishing a limited system of wireless regulation, but as you are aware, during the period of the war, the operations of the Department of Commerce have properly and necessarily been subordinated to military exigencies requiring full control by the Navy Department.

In war times the Navy Department should unquestionably be supreme and undisputed in this field. Since we entered the war the Navy Department has developed a large personnel and the administrative machinery, and it has accordingly an organization ready for Government ownership, if Government ownership is to come. Furthermore, radio communication is essentially the means of communication at sea and between ships and the shore, so the Navy at all times necessarily has a large interest in its highest development and orderly operation.

If the two fundamental principles, Government ownership of all agencies of radio communication and the operation of those agencies by the Navy Department, commend themselves to the judgment of your committee, I am quite

sure that in all administrative details you would be disposed to defer to the judgment of that department. For this reason, an expression of opinion on my part concerning the mere administrative details of the measure seems unnecessary. The measure, however, as a whole has my approval.

Respectfully,

WILLIAM C. REDFIELD,
Secretary.

HON. J. W. ALEXANDER,
*Chairman Committee on Merchant Marine and Fisheries,
House of Representatives, Washington, D. C.*

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, December 11, 1918.

The CHAIRMAN COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,
House of Representatives.

SIR: I am in receipt of your letter of December 5, 1918, inclosing copy of bill, H. R. 13159, "to further regulate radio communication," and requesting that the committee be given the views of this department as to whether or not it will be advisable to enact the bill into law.

This bill, providing for Government ownership and operation of all radio stations on land engaged in commercial business, has the unqualified approval of this department. It is not desired, however, that this approval of Government ownership in this specific instance shall be taken to indicate in any degree whatever the views of this department concerning the general principle of Government ownership of public utilities other than radio communication.

The peculiar property associated with radio signals, whereby such signals traverse space in all directions and register their effect on all receiving apparatus within range, would quickly result in confusion and very materially reduce service which mariners may justly expect of this valuable discovery, were stations permitted to operate without adequate Government regulation of radio traffic.

The vast increase in our merchant marine that is now under way will bring about a corresponding increase in the volume of business handled by radio along our shores, and unless efficient Government control of radio traffic is provided for, increased volume of business will be accompanied by an increase in interference between stations both ashore and afloat that will render the handling of this increased volume of business a very difficult task.

Experience has shown, and the principles approved by the International Radio Telegraphic Convention indicate, that competition for business between rival coastal stations is inimical to the efficient development of reliable communication between ship and shore. The monopoly by one system of the coastal radio traffic of the country is essential to the control of radiotelegraphic communication required to give the best service. Such monopoly has been attempted in the United States by at least one commercial concern, but, due to meager revenues from land stations, it has been found impracticable to maintain in operation the chain of stations necessary to the success of such a monopoly.

It is believed that the few companies owning commercial radio stations will welcome this opportunity to dispose of their property for a just compensation and to quit the field of commercial radiotelegraphy, in which, after 18 years of effort, they have learned that the successful conduct of radio traffic and the financial return necessary to give life to the enterprise require a monopoly of the radio communication and traffic afloat and ashore, which they have been powerless to construct.

It is considered that the Government of the United States is the only agency by which is feasible the necessary monopoly of land stations for commercial traffic under one administrative head. The Government can maintain such stations and can guarantee efficient service to the people of the country at large at reasonable rates and to vessels at sea with certainty and dispatch. Should the bill become a law, the Government will be in a position whereby it can issue orders and regulations that will make possible the handling without confusion of the maximum amount of radio business along the shores of the United States, and particularly within certain congested areas. This orderly control of traffic along our shores, guaranteeing as it does the prompt and reliable response to distress calls in time of disaster at sea, is viewed by this

department as a measure of insurance that our merchant marine may rightly demand of the Government.

Since the outbreak of the war the Navy Department has been handling in a very efficient manner all radio traffic between ship and shore in the United States, as well as all transoceanic radio traffic to or from the United States. It has built up an establishment for radiotelegraphy that can supply operators and apparatus to carry out efficiently all the obligations to be imposed upon that department by the contemplated legislation.

The present time is considered opportune for the enactment of the legislation embodied in the attached bill. At present no land stations are in operation under private control, so that no change in the existing status of affairs pertaining to radio traffic will result from Government purchase and operation of radio stations for commercial traffic should this bill become a law prior to the proclamation of peace.

In view of the great benefits that will accrue to the maritime interests of the United States and to the public at large through the passage of this bill, its speedy enactment into law in the form submitted is earnestly recommended.

Respectfully,

W. G. McADOO.
Secretary.

DEPARTMENT OF LABOR,
OFFICE OF THE SECRETARY,
Washington, December 11, 1918.

HON. J. W. ALEXANDER, M. C.,
Chairman Committee on the Merchant Marine and Fisheries,
House of Representatives.

MY DEAR MR. ALEXANDER: I have received your letter of the 5th instant, inclosing a copy of the bill H. R. 13159 to further regulate radio communication, and asking for an expression of my views as to whether or not it would be advisable to enact said bill into law.

When the bill H. R. 19350 was under consideration, that being a bill having a similar object in view, I wrote you, under date of January 9, 1917, as follows:

"I have the honor to acknowledge the receipt of your letter of the 23d ultimo in which you call attention to the bill (H. R. 19350) to regulate radio communication, a copy of which you inclose. You ask that I give your committee the benefit of such suggestions as I may care to make regarding the desirability of enacting the bill into law.

"Taking the bill as a whole, I regard it as a very desirable measure—one which is very much needed and which will go a long way toward remedying evils and difficulties which the experience so far had with radio communication has demonstrated to exist and to require some well-devised and comprehensive action on the part of the Federal Legislature.

"When an interdepartmental committee was formed something over a year ago with the purpose of having a thorough study made of the problems which have arisen and which are likely to arise in connection with the recently developed method of electrical communication, and when selecting a representative of this department to serve upon that committee I expressed the opinion that, in view of the fact that radio communication can not be confined to definite channels to which specific title could be conveyed to individuals or corporations, it ought to be owned and controlled by the Government. Soon after the interdepartmental committee met and organized it requested the heads of the various administrative departments to express a definite opinion as to whether the committee in carrying on its work should have in view the actual acquirement of all existing radio stations, or how far in that direction the bill which it was proposed to draw should go. To this communication I replied by restating the opinion which I had expressed at the outset in detaching a representative. The report submitted to this department by its representative after the committee had completed its labors, the results of which constitute the draft of the proposed measure now under consideration by your committee, shows that the said representative and those serving upon the committee as representatives of the military branches advocated throughout the deliberations of that body the ownership by the Government of the wireless telegraph; that the drafted measure, like all productions of its kind, in the formulation of which a number of individuals take part, is to a considerable extent in a number of its features the outcome of compromises between the

members of the committee who entertained various views concerning this subject.

"I have had no reason to change my mind on this very important question. Upon reading the report of the department's representative and considering the various provisions of the measure produced in the manner above described by the interdepartmental committee, I am more than ever convinced that Government ownership is the real solution of our radio communication problems. I observe that there are many provisions in the drafted bill that tend toward ultimate Government ownership; but I wish to direct attention to two provisions in particular, one of which I think logically constitutes an argument in favor of going further in that direction than the bill at present does, and the other of which I think should be materially changed in order to hasten the ownership by the Government of at least that part of the wireless telegraph business which it is of the greatest importance that the Government shall absolutely control, for reasons of a military, neutrality, and commercial nature.

"It is provided in the next to the last paragraph of section 5 (p. 6, line 16, to p. 7, line 2) that in the Philippine Islands, in the Canal Zone, in certain United States territory in the West India Islands, and in a geographically defined section of the Pacific Ocean, no private radio station shall hereafter be operated on land or on a permanently moored vessel. It is understood, of course, that this step toward Government monopoly can readily be taken because the field involved has been occupied quite completely with Government stations and that stations controlled as private enterprises have not been erected within such territory. But it seems to me that if it is sound upon principle to contend that the Government should have a monopoly of wireless telegraph in these particular sections, by the same token that system of electrical communication should be a Government monopoly elsewhere.

"Section 6 of the proposed measure (p. 7, lines 7-13), I think, would be very much improved if changed to read substantially as follows:

"Sec. 6. That after three months from the passage of this act the Government, through the Navy Department, shall have authority to acquire by condemnation proceedings any radio station now in operation in the United States."

"Commending to the very careful consideration of your committee the suggestion made above, I beg to subscribe myself."

Since the above-quoted letter was written I have had no reason to change my views with regard to the Government ownership of radio communication.

Very truly, yours,

W. B. WILSON, *Secretary.*

DEPARTMENT OF STATE,
Washington, December 14, 1918.

The honorable JOSHUA W. ALEXANDER,
House of Representatives.

SIR: I have the honor to acknowledge the receipt of your letter of December 5, 1918, inclosing a copy of H. R. 13159, Sixty-fifth Congress, second session, entitled "A bill to further regulate radio communication," and requesting my views as to the advisability of enacting the bill into a law.

In reply I beg to inform you that I am in accord with the policy of Government ownership of radio stations in the United States and its possessions, and, in my opinion, it will be to the advantage of the United States in its international relations to have enacted into a law some bill such as H. R. 13159, providing for the acquisition by the Government of radio stations on land or on permanently moored vessels within the jurisdiction of the United States or any of its possessions, and for the regulation and censorship of all radio stations and radio apparatus within the jurisdiction of the United States in time of war or national emergency.

I would suggest that, in the definition of the term "person" on page 2, line 7, the word "individuals" be added immediately after the word "includes," so that this definition will read "The term 'persons' includes individuals, partnerships, corporations, and associations."

I note that section 2 provides "That the President shall requisition and take permanent possession of, for the use of the Government," certain classes of radio stations. The word "requisition" under existing usage implies the

taking or use of private property for belligerent purposes. If, as would appear to be the case, the present bill is not intended to be a war measure it is possible that it may be desired to substitute for the word "requisition," on page 2. line 9. of the bill some such word as "acquire," or phrase as "to acquire title to."

I have the honor to be, sir,
Your obedient servant,

FRANK L. POLK,
Acting Secretary of State.

(The chairman also submitted the following telegrams for the record:)

NEW YORK, N. Y., December 14, 1918.

Judge J. W. ALEXANDER,
*Chairman Committee Merchant Marine and Fisheries,
House of Representatives, Washington, D. C.:*

We are in favor of the provisions of House bill 13159 and strongly urge its passage as in the national interest. All radio stations on land should be taken over and permanently operated by the Government.

P. A. S. FRANKLIN,
President International Mercantile Marine Co.

NEW YORK, N. Y., December 11, 1918.

Hon. J. W. ALEXANDER,
*Chairman Committee on Merchant Marine and Fisheries,
Washington, D. C.*

The Maritime Association of the Port of New York reaffirms its previous action regarding the regulation of radio communication and strongly urges that H. R. 13159 be favorably reported by the Committee on the Merchant Marine and Fisheries, believing that the enactment of this measure would be of great value to shipping in general.

MARITIME ASSOCIATION OF THE PORT OF NEW YORK,
EDGAR E. LOTHBRIDGE, *President.*

(The chairman also submitted the following letter for the record:)

PANAMA RAILROAD COMPANY,
PANAMA RAILROAD STEAMSHIP LINE,
New York, December 13, 1918.

CHAIRMAN MARINE AND FISHERIES COMMITTEE,
House of Representatives, Washington, D. C.

SIR: We have been asked by representatives of the Navy Department to advise you whether or not our company has any objections to offer to bill No. 13159 relative to the regulation of radio communication.

Our company, as you know, is owned by the Government of the United States. We are operating 12 steamers of a dead-weight capacity, ranging from 4,500 to 15,000 tons; 2 of our steamers are equipped with 5 kilowatt Kilbourn & Clark sets, and the remaining 10 are equipped with Telefunken sets, most of which are 2 kilowatt.

We have no objections to offer to any of the provisions of the bill.

Yours respectfully,

T. H. ROSSBOTTOM,
Assistant to Vice President.

(The chairman submitted for the record the following letters, which cover the grounds of the many protests from the amateurs all over the country to the bill:)

WARRENSBURG, Mo.,
December 19, 1918.

Hon. J. W. ALEXANDER,
Washington, D. C.

DEAR SIR: I see you are the author of a bill (H. R. 13159) whereby all amateur radio stations shall be closed for all time. May I have the privilege of

asking you why you omitted the clauses referring to amateurs as outlined in Mr. Padgett's bill? Now, to my knowledge, the amateurs are a very beneficial set of fellows to the United States. How many of them that were eligible joined the Signal Corps when our country entered the great struggle? Already having much knowledge of electricity and experience as operators, they could be put in the field immediately. The great fascination of wireless has drawn many young men into the electrical field, there to make many useful inventions. How many ideas or great inventions were first born in attic radio station and laboratory? These are a very few reasons why the amateurs must stay. How about the great business of constructing and distributing amateur instruments? How about keeping young men at home at night who otherwise might go out on the streets in bad company? Hoping you will see the amateurs in a new light and change your mind in regard to their being wiped off the map forever, I remain,

CARL C. GREIM.

WARREN, ARIZ.,
December 16, 1918.

Hon. J. W. ALEXANDER,
Washington, D. C.

DEAR SIR: The protest against the injury that will be done many young men of this country if House bill 13159 and Senate bill 5306—which may prohibit amateur wireless—are passed without a full and free hearing.

It will take time for the amateurs to present their case, because most of them are in the Army and Navy. The bill should be held up until their return.

Why were the clauses referring to amateurs, as outlined in Mr. Padgett's bill, struck out?

Yours very truly,

MEADE W. POWELL.

SANTA CRUZ, CAL., December 17, 1917.

Hon. J. W. ALEXANDER,
House of Representatives.

DEAR SIR: Of recent date there has been a very severe debate upon the subject of the reopening of amateur wireless stations. Although I am not an expert on this subject, I am very deeply interested in it, and it would mean a great loss to me if a bill were passed closing we amateurs out for good. I am only one in many thousands who are also in this same frame of mind and who would rejoice at the reopening of the amateur station, and on account of this I would feel it would mean the ceasing of this object in the upgrowing generation. I hope you will not overlook these few hasty points which are so valuable to we American boys and girls. I remain,

Very respectfully,

EARL H. HARRIS,
Secretary-Treasurer Santa Cruz Radio Association.

REDLANDS, CAL., December 16, 1918.

Hon. J. W. ALEXANDER,
Washington, D. C.

DEAR SIR: I have been reading some of the laws as to effect of closing amateur radio stations, and for one I do not think it proper.

I have been an amateur for sometime, and was under the impression that we were only to dismantle our sets for the duration of the war, and now I see we have the honor of being done away with.

I would like to bring in my statements to the effect that I want to see the amateurs remain as before. I have found my set an education to me in two forms, as I might state: First, it gave me an improvement in the electrical line and also far more improvement in the apparatus.

I know a friend of mine who had a set before the United States entered the war and he has, I might state, invented some small instrument. I do not know what it was, as he does not tell, but it improved the set almost 80 per cent.

If we are cast out, it will mean that there won't be so many new inventions found in the radio line as there might be discovered if we all were to stay to-

gether; also it will help to get radio operators for government use in case of emergency at a least cost to the Government to educate them for such service, as they already have some knowledge from their own sets.

Now, if we were cast out, and in the future radio men should be needed for emergency, look what expense it would be to teach them the game.

Hoping this letter is a mite to our success and that we will be on the map again and in our little, happy chair, in the attic, with a receiver on our head, I am as ever,

Yours, respectfully,

HARRY WILLIAMSON,
10 South Church, Redlands, Cal.

1227 NORTH CALVERT STREET, BALTIMORE, MD..

November 6, 1918.

CHAIRMAN COMMITTEE ON THE MERCHANT MARINE AND FISHERIES,

Washington, D. C.

Subject: The Alexander bill, H. R. 13159.

SIR: My attention has been called to the bill of above number and common title which I understand has been referred to your committee for consideration and report.

I desire to vigorously protest against the passage of this proposed measure, which is plainly an attempt to give the Navy absolute control over all radio communication and another governmental ownership or control proposition, of which there are already too many. My reasons of protest are specifically as follows, viz:

1. The bill ignores the amateurs, who, in the approximate number of over 5,000, now in the Army and Navy service alone, constitute the backbone of the radio branches of those arms of the military machine and who required practically no additional training to fit them for the recent emergency of the Nation. These men are the best in the service.

The measure in question is also presented at a time when these men are absent in the service of their country, and whose lips are sealed in their defense by military restrictions or etiquette.

2. The bill, if passed, will also discourage the interest and initiative of thousands of men in the amateur field who have been the principal contributors to the development of radio telegraphy and telephony.

3. The practical working effect of the bill would deprive the amateurs of their radio plants, resulting in the loss of hundreds of thousands of dollars now invested by them, and would unquestionably engender a feeling of antagonism against the Government, especially among the men now in the service, who expect to resume their radio activities and research work in the amateur field on their return to civilian life. In most instances these men are ignorant of the bill proposed, and this is true of the majority of the amateurs in civil life.

4. Another effect of the bill will be to seriously delay the war machine in an important branch in any future national emergency, due to the lack of skilled radio operators.

5. The bill is an unjust abridgment of civil rights and liberties, and another step toward radical paternal government which our Constitution never contemplated, nor is it desired by the people.

I write the above particularly in behalf of my only son and his two best friends, all three in the radio branch of the Navy through voluntary enlistment at the very beginning of the war, and in active sea duty up to this time.

I speak for them and thousands of other radio amateurs in the Nation's service, as they would if given the opportunity. I believe it best that the present law of August 13, 1912, defining the status of amateur radio operators be allowed to stand without revision and the present jurisdiction of the Department of Commerce in such matters remain invested in that branch of the Government, and trust that your committee will report unfavorably on the bill now before it.

Yours, very truly,

C. F. HEWITT.

MARIETTA, OHIO, December 10, 1918.

CHAIRMAN COMMITTEE ON THE MERCHANT MARINE AND FISHERIES.

Washington, D. C.

DEAR SIR: We, the members of the Marietta Radio League, protest against House bill 13159 and Senate bill 5306, because it will do a great injury to the young men of this country.

As there are a great number of the amateur wireless men in the service the bills should be held up until they can be informed of the impending disaster which threatens them and all the young men of the country who take an interest in wireless activities.

When the United States entered the war the Army and Navy drew from the amateur field approximately 5,000 operators who were highly skilled in the art and needed practically no additional training before assuming active duties. These men are considered the best in the service. With these facts in mind, do you not think that the amateurs in this country, as well as the amateurs now in the service, are entitled to some consideration?

Very respectfully, yours,

STANLEY W. CARROLL,

President of the Marietta Radio League.

NEW ORLEANS, LA., December 17, 1918.

HON. JOSHUA W. ALEXANDER,

Washington, D. C.

DEAR SIR: I note House bill 13159, introduced by you, which will have the effect of closing all amateur wireless stations.

You are no doubt well aware that nearly all the amateurs are away from home, in the Army and Navy, and that regulations prohibit them from voicing their sentiments against this un-American act, which would deprive the valiant men who so nobly manifested their spirits of patriotism by volunteering immediately upon the call to arms as radio men.

So badly was the Government in need of operators that most of the amateurs were given commissions as officers and petty officers, their knowledge being derived from the experimenting done on their amateur sets.

The Government would have been in a rather compromising position had it not been for the amateur. You will also note that all the great radio men were developed from the ranks of amateurs.

I, as an amateur, am not interested as to whether the Government takes over the commercial stations or not; only have a clause which will eliminate the amateur from this bill and permit him the rights he enjoyed before the war.

This bill if passed would, however, stifle all the ambition and interest of men who are interested in the development of this science and cause quite a loss of American dollars invested by the thousands of amateurs in stations.

Government records will bear me out that all the amateurs are not small boys in knee breeches, who love to tinker with the electric switches and telegraph keys, but as a whole are hard-thinking and earnest men, who devote many hours to this science.

Wireless among the amateurs, from a social standpoint, has an efficacious influence in developing the moral standard of the young men of our country. They remain at home many evenings, instead of being associated with people of questionable characters.

Let us have clean American men, straightforward in all their actions. The amateur has proved this during the past year.

Give him the same rights he has always enjoyed. He can do no harm, but lots of good, and please modify your bill so as to recognize the amateur and his want.

Thanking you, I am,

Yours, very respectfully,

JOS. C. BEHRE.

BOY SCOUTS OF AMERICA,
New York City, December 10, 1918.

HON. JOSHUA W. ALEXANDER,
Washington, D. C.

MY DEAR SIR: I was very much surprised on examining your bill, H. R. 13159, which was introduced in the House of Representatives November 21, 1918, and referred to the Committee on the Merchant Marine and Fisheries, to find that

its provisions would make it impossible for Boy Scouts and other radio amateurs to continue their work which has been so useful to our Government.

Consultation with the district communication service office of the Navy Department in New York City has confirmed our belief that the Navy is in favor of giving the radio amateur an opportunity to continue his studies and experiments. In fact, an officer in the Navy Department stated that the Navy needed the radio amateur and would be at a loss to know where to turn for a source of personnel if your bill should pass in its present form.

Certainly it is desirable to so restrict the radio amateur as to reduce to the minimum the possibility of his interfering with Government or commercial radio communication. An officer of the Navy has suggested to us that it might be desirable to put an amateur on a 150-meter wave length and confine him to a sending radius of 20 to 30 miles.

In view of the fact that there are more than 100,000 radio amateurs in the United States, and that their investment in radio apparatus, at a very low estimate, exceeds \$5,000,000, I believe that the passage of your bill in its present form would be most unfortunate. In fact, it would be saying to the citizens of the United States that this whole interesting subject of radio communication was closed except to those who enlisted in the Navy and those who could afford an expensive course in a technical school.

The Boy Scouts of America were of material assistance to the Navy Department, as no doubt you know, at the beginning of the war. They discovered and reported to the Navy investigators hundreds of cases of illegal radio apparatus.

Our organization will be represented at the hearing on Thursday of this week. We sincerely hope that you will feel inclined to favor an amendment which will permit Boy Scouts and other radio amateurs to continue their work under such restrictions as may be reasonably imposed.

Sincerely and cordially, yours,

JAMES E. WEST,
Chief Scout Executive.

BOY SCOUTS OF AMERICA,
New York City, December 16, 1918.

MR. PAUL SLEMAN,
Colorado Building, Washington, D. C.

MY DEAR MR. SLEMAN: In accordance with your suggestion made this morning, I drafted the following proposed amendment to take the place of section 5 in H. R. 13159, a bill to further regulate radio communication:

"SEC. 5. That from the date of the passage of this act the Secretary of the Navy shall be charged with the execution of the provisions of the act to regulate radio communication approved August thirteenth, nineteen hundred and twelve, which provide that radio amateurs shall be allowed to erect, maintain or operate for experimental and private use, radio stations if properly licensed, as provided by said act to regulate radio communication approved August thirteenth, nineteen hundred and twelve; and with the continuance in full force and effect of the system of examinations and licenses for radio amateurs provided for in said act to regulate radio communication approved August thirteenth, nineteen hundred and twelve."

I have just read this over the phone to Radio Inspector Guthrie, of the United States Customhouse Service, and he says it meets the situation. If you have an opportunity to present it to any authority in Washington, I wish you would do so. I know even less about legislation than I do about radio and I would like to make sure that the wording of the section is correct.

Your help in this matter will be appreciated by the radio amateurs. There are more than 100,000 of them and they will be very hard hit if the bill goes through without an amendment in their favor.

Very truly yours,

W A. PERRY,
Editor of Scouting.

(Mr. Greene submitted the following letters to be incorporated in the record:)

COLONIAL NAVIGATION CO., PIER 39, NORTH RIVER,
New York, December 12, 1918.

HON. WILLIAM S. GREENE,
House of Representatives, Washington, D. C.

SIR: We understand there is a movement looking toward the Government taking over the radio communication of the country, and on behalf of my steam-

ship line, The Colonial Navigation Co., I wish to most emphatically record my protest against this being done.

Our company operates a daily line of passenger steamers between New York and Providence, R. I., and the steamers are all equipped with wireless apparatus and operators. Prior to the war we received excellent service, feeling we were in immediate communication with our steamers at all times, placing us in a position not only to render assistance to our own vessels, but to those of any other line on the route which might require it, keeping us fully posted as to just when the vessels would arrive at dock, enabling us thereby to advise the public awaiting the arrival of friends or relatives on the steamers as to just when the steamer would dock, and thus making it possible not only for ourselves but the public both on land and on the vessels to transmit any messages to or from the steamers, which has proved of great value and convenience.

Our experience for the past 18 months, during which time the Government has had charge of the radio service, has been very unsatisfactory and the service which we have received from this source practically nil. If, therefore, you can do anything which will assist in the retaining by the owners of their several radio companies or other properties we urgently request that you do so and from a practical service-receiving, service-giving standpoint you will be taking the right course.

As an instance, to-day one of our steamers, on account of fog, due in New York at 7 o'clock a. m., was late. The captain sent us a wireless advising us that he would dock at 9 a. m. He did dock promptly at 9 o'clock and we had received no message from him. The steamer sailed at her usual time from our dock for Providence at 5 o'clock, and about 5.30 a messenger boy came in with a telegram from the wireless station in New York City giving us the captain's message that he would dock at 9 o'clock a. m. In other words, the boat arrived and sailed and a day had gone by before the message was delivered which should have reached us not later than 7 o'clock in the morning. This is a sample of the efficiency of the service to commercial interests which, of course, is the standpoint from which the proposition interests the ship owner and the public.

Respectfully, yours,

F. M. DUNBAUGH, *President.*

FALL RIVER, MASS., *December 5, 1918.*

Hon. WILLIAM S. GREENE,
Washington, D. C.

DEAR SIR: As one of the 5,000 amateur radio operators who enlisted in the Navy at the beginning of the war when the Government vitally needed us, I wish to protest to you concerning the injustice of the Alexander bill, H. R. 13159, which is now before the House of Representatives in Washington.

The bill provides that the Navy shall take over all radio stations and entirely ignores the radio amateur. "Radio amateur" is merely a name given to a certain class of radio operators who are in the game for fun and for development of radio. They include persons between the ages of 14 and 65, embracing, among others, many prominent men in various professions and businesses.

Under the law of August 13, 1912, the radio amateur was provided for and allowed to own and operate a radio station under certain reasonable restrictions and limitations. The leading Navy radio receiver of to-day is based on the regenerative principle which was discovered and developed by Edwin Armstrong, an amateur, now a captain in the United States Army. The Navy recently purchased the invention of John Hays Hammond, jr., the wireless controlled torpedo, the idea of which was originated during his experiments as a radio amateur. If this bill goes through and the radio amateur is annihilated, the development of radio telegraphy in this country will decrease so much that other countries will soon lead us in the development instead of our leading them, which up to this time is the case.

Besides depriving the amateur of a chance to help develop the science of radio, this bill would have four other bad effects:

1. To give the absolute control over all radio communication to the Navy. This would be little short of imperialism.
2. Eliminate the initiative tending toward improvements, inventions, and progress in art.
3. Seriously delay the war machine in any future emergency due to the shortage of skilled operators.

4. Will create a feeling of antagonism against the Government on the part of amateurs now in the service who expect to reopen their stations when they come back home.

Of the 5,000 radio amateurs who entered the service, there are but few who have a chance to protest against this injustice which will forbid them from reopening their former stations and thus bring all their former research work to naught.

Hoping that I have not taken up too much of your valuable time and that you will help stop this injustice to radio amateurs, I remain,

(Name withheld by request.)

Yours, very truly,

P. S.—I have been a radio amateur for eight years and entered the Navy the day war was declared.

(Memorandum prepared by Capt. Todd in response to a question by Mr. Edmonds on p. 145:)

Relative to your request for a comparative statement of wages paid to radio operators, both Navy and commercial, at shore stations, the following is taken as a basis of the average shore station.

The operator is not usually detailed to a shore station unless he has had at least two or three years' practical experience both in the commercial and naval service. The operator first obtains his experience as assistant operator aboard ship:

Naval operator (clothing to the extent of \$100 is furnished on first enlistment only):

Chief electrician (radio).....	\$137
First-class electrician.....	115
Second-class electrician.....	104
Third-class electrician.....	93

Commercial operator (at some places quarters are furnished):

Manager of station.....	100
Operator.....	80
Do.....	60
Do.....	60

(Affidavits referred to by Mr. Maxim on p. 252.)

AFFIDAVIT.

STATE OF NEW YORK,

City and County of New York, ss:

J. Owen Smith, being duly sworn, deposes and says: For the past 10 years I have been a student of radio telegraphy and telephony in an amateur way. During that time I learned enough about the art to enable me to serve during the war as a radio aeronautical engineer in the radio branch training section, Division of Military Aeronautics, Washington, D. C.

During the early summer of 1918 I purchased the material necessary for the construction of a radio station and supervised the erection and operation of this station at the headquarters of the Division of Military Aeronautics. A copy of the formal order placing me in charge of the station is attached.

One of the principal reasons for erecting the station, in addition to voice-commanded flying, was to copy-press daily from English, French, German, and Italian stations for the radio executives of the division. Considerable difficulty was experienced in copying trans-Atlantic press, however, with the standard receiving sets furnished by the Government, owing to interference from the Arlington station, static induction from a nearby substation, and trolley cars.

I therefore had my own receiving set designed by an amateur, Mr. P. F. Godley, and manufactured for amateur use, with a range of 200 to 20,000 meters, sent to Washington, and after its installation the enlisted operators detailed to the station had no difficulty in copying several thousands of words of press each day from transmitting stations across the Atlantic, which was made up into book form daily and delivered to the radio executives of the Division of Military Aeronautics.

It was necessary at one time to take the Godley set out of service for some slight repairs, and although a standard Cohen receiving set, which cost \$500 as against \$300 in the case of the Godley set, was put in use in its place, the enlisted officers reported to the commanding officer of the radio branch that they could not successfully and connectedly copy trans-Atlantic press with it.

The copying of several thousand words of trans-Atlantic press daily is a really unusually good achievement, considering Washington latitude and consequent static during the summer and fall months, and the nearness of Arlington, which transmitted almost continuously.

I was successful in handling this through the experience I gained as an amateur radio experimenter.

J. OWEN SMITH.

Sworn and subscribed to before me this 10th day of December, 1918.

DAVID HERSHFELD,
Commissioner of Deeds, New York City.

AFFIDAVIT.

STATE OF NEW YORK,
City and County of New York, ss:

J. Owen Smith, being duly sworn, deposes and says:

In October, 1918, while serving as a radio aeronautical engineer in the Division of Military Aeronautics at Washington, D. C., I had a conversation with Capt. Ferguson, R. A. F., bearing on the work done by amateur radio operators in the war.

Capt. Ferguson expressed surprise at the number of radio amateurs who had done good work during the war, and expressed much appreciation of their expertness in the art and their ability to hold important and confidential positions in various branches of the Government.

He further said that the ability of the United States to get her war program under way so quickly was due to a certain extent to the fact that so many self-trained radio operators were instantly available for service here. There had been no trained amateurs in England to rely upon at the beginning of the war. They had to be trained after war was declared. He said that the advantage in allowing radio operators to experiment, under intelligent supervision, was obvious.

J. OWEN SMITH.

Sworn and subscribed to before me this 10th day of December, 1918.

[SEAL.]

DAVID HERSHFELD,
Commissioner of Deeds, New York City.

MARCONI WIRELESS TELEGRAPH CO. OF AMERICA,
NEW YORK, December 30, 1918.

MR. J. C. BAY,
*Clerk Committee on the Merchant Marine and Fisheries,
United States House of Representatives, Washington, D. C.*

DEAR MR. BAY: In response to a request, on page 184 of the hearings, for copies of data in our files touching laws relating to ownership and control of wireless in Mexico and Central America, I beg to send you herewith copies of translations of constitutional provisions for Mexico, Nicaragua and San Salvador; translation from the law of telegraphs of Costa Rica, and clippings from the 1918 issue of the Year Book of Wireless Telegraphy, which give information concerning Mexico, Guatemala, Nicaragua, Panama, San Salvador, and British Honduras.

You will note that we have no information about the wireless regulations in Spanish Honduras.

Very truly, yours,

E. J. NALLY,
Vice President and General Manager.

(For additional information concerning wireless laws and regulations see 1918 Year Book of Wireless Telegraphy and Telephony, published by the Wireless Press (Ltd.), Marconi House, Strand, London, and 42 Broad Street, New York.)

GUATEMALA.

[Clipping from Year Book of Wireless Telegraphy, 1918.]

The Republic of Guatemala lies southeastward of Mexico, and is almost shut off from the Atlantic Ocean by British Honduras on the north and by the Republic of Honduras on the southeast. Puerto Barrios and Livingston constitute the chief ports of the Republic on the Atlantic seaboard (San José, the chief port), Champerico and Ocos on the Pacific.

The Republic in its present form was established on March 21, 1847, after having formed part, for 26 years, of the Confederation of Central America. The constitution dated from December, 1879, modified in 1885, 1887, 1889, and 1903. At the present moment radiotelegraphy is represented by a pair of American stations at Guatemala City and Puerto Barrios, respectively.

This installation is nominally under the supervision of the minister of public works, but is entirely under the personal direction of the President. An American operator named Mr. J. H. Watts, of the United States Navy, has been lent to the Government for the purpose of superintending the working.

No laws and regulations have up to the present been issued in Guatemala to regulate the use of wireless.

PANAMA (CANAL ZONE.)

[Clipping from Year Book of Wireless Telegraphy, 1918.]

The idea of a canal through the Isthmus of Panama originated with a Spanish engineer in 1530. Monsieur de Lesseps labored on its construction from 1882 to 1904, when the United States Government took over the undertaking. This action of the United States of America followed closely on the establishment of a separate Republic of Panama (a secession from the United States of Columbia), which took place on November 23, 1903. The American canal was opened for traffic on August 15, 1914.

The American-controlled zone consists of a strip of land 10 miles in width, extending across the Isthmus a distance of 50 miles. The rights of sovereignty are vested in the United States of America under a treaty signed on February 26, 1904.

The zone is ruled by a governor, who reports through the Secretary of War to the President and conducts the government according to the authority invested in him by acts of Congress and Executive orders. In periods of crisis or times of war the supreme command is vested in the commanding officer of the troops, designated as the Panama Canal Department of the United States of America Army. Radiotelegraphy in the zone is administered by the Navy Department of the United States, who detach a naval officer designated as radio officer for the purpose of its supervision.

The first radio station erected was situated in the Republic of Panama, within the municipal limits of the city of Colon, in 1906, and the reservation there established is still the site of a successor to this pioneer station.

Under agreement between the Republic of Panama and the United States of America radiotelegraphic communication within the Republic, as well as in the Canal Zone, remains under the control of the United States of America. This arrangement rests on decree No. 130 of August 29, 1914, signed by the president of the Panama Republic.

The small station established at Porto Bello, Panama, in 1909 was closed or May 13, 1914. The Colon station, established on March 1, 1910, was reequipped with improved apparatus and opened to commercial traffic in January, 1913. At Balboa (Pacific end of the canal) there stands a station opened for commercial business in June, 1913, and replaced by an improved installation on the same site in 1914. The well-known "Darien" station (located alongside the canal, midway between the oceans) is a high-power installation designed primarily for communication with Washington and for naval vessels at sea. It possesses a sending radius of 3,000 miles and was placed in regular service on April 5, 1915.

There are no wireless clubs or radio societies, the whole of the wireless operations being controlled and administered by the United States Navy.

The "Darien" station sends out time and weather signals daily (see under "Time and weather signals" section of the Year book). The radio stations at Colon and Balboa send broadcast at 4 a. m., at noon, at 4 p. m., and 8 p. m.

any notices to mariners which may be supplied by the port captains for the respective ends of the canal. An unofficial news service for the benefit of persons at sea is carried on by the Colon station, which each day at 3.30 p. m. radiates broadcast about 200 words of news made up of extracts from the Panama morning papers.

We publish below the text of the various acts and decrees affecting radio-telegraphy in the Canal Zone in accordance with the following list:

A. Act to regulate radio communication issued August 13, 1912. (See pp. 410-415.)

B. Section 6 of the act to provide for opening, maintenance, protection, and operation of the Panama Canal (dated Aug. 24, 1912).

C. Extracts from rules and regulations for the operation and navigation of the Panama Canal dated July 9, 1914.

D. Notice concerning commercial service at naval stations dated September 1, 1913.

E. Circular re compulsory wireless dated July 23, 1914.

F. Circular re free radio service dated November 17, 1914.

G. Circular re suspension of radio service dated May 12, 1917.

H. Extract from supplement to Panama Canal rules dated May 23, 1917.

EXTRACT FROM ACT—TO PROVIDE FOR OPENING, MAINTENANCE, PROTECTION, AND OPERATION OF THE PANAMA CANAL.

[Dated August 24, 1912.]

B. SEC. 6. That the President is authorized to cause to be erected, maintained, and operated, subject to the International Convention and the act of Congress to regulate radio communication, at suitable places along the Panama Canal and the coast adjacent to its two terminals, in connection with the operation of said canal, such wireless telegraphic installations as he may deem necessary for the operation, maintenance, sanitation, and protection of said canal, and for other purposes. If it is found necessary to locate such installations upon territory of the Republic of Panama, the President is authorized to make such agreement with said Government as may be necessary, and also to provide for the acceptance and transmission by said system of all private and commercial messages and those of the Government of Panama on such terms and for such tolls as the President may prescribe: *Provided*, That the messages of the Government of the United States and the departments thereof, and the management of the Panama Canal, shall always be given precedence over all other messages. The President is also authorized in his discretion to enter into such operating agreements or leases with any private wireless company or companies as may best insure freedom from interference with the wireless telegraphic installations established by the United States.

EXTRACT FROM RULES AND REGULATIONS.

[Dated July 9, 1914.]

C. 40. *Radio communication and report.*—As soon as radio communication can be established with the canal, vessels should report their names, nationality, length, draft, tonnage; whether or not they desire to pass through the canal, require coal, provisions, supplies, repairs, to go alongside of a wharf, the use of tugs, probable time of arrival, length of stay in port, or any other matters of importance or interest. If this information has been previously communicated through agents or otherwise to the captain of the port, it will not be necessary to report by radio; but the probable time of arrival should always be sent.

41. Control of radio communication is entirely in the hands of the radio shore stations. No vessel will be allowed to interfere in the slightest degree with the canal radio stations; upon an order being received by a vessel at any time while within the waters under the control of the canal to discontinue using radio, even if in the midst of transmission of a message, she shall immediately comply.

42. Upon a ship's arriving within the 15-mile limit, and until leaving the 15-mile limit of the Canal Zone, she shall transmit only with low power, not exceeding one-half kilowatt.

43. Messages to stations will be sent only to Colon station (NAX) when in Gatun Locks and to northward thereof, and only to Balboa station (NPJ) when in Miraflores Locks and to southward thereof; between these two points ships may work to either station, preferably to the nearer one; the high-power station (Darien) at Radio will not handle commercial work and will not be called for canal business except in case of emergency.

44. All messages between ships in the Canal Zone and ships at sea must be forwarded through the nearer shore station.

45. Messages from ships in the Caribbean Sea for ships in the Pacific waters, or vice versa, shall be routed through the Canal Zone shore stations.

46. All vessels fitted with radio, after leaving the terminal harbor to pass through the canal, shall keep an operator on watch until the further terminal harbor has been reached; this applies to the time when they are anchored in Gatun Lake, while passing through the locks, or moored to the lock walls, or to any of the wharves in the canal proper, as well as when they are under way. Messages relating to the ship's movements and the canal business shall take precedence over all commercial messages.

47. Pilots on vessels passing through the canal shall have the right to use a vessel's radio freely for the transaction of the canal business.

48. Under the direction of the pilots, vessels will from time to time report their progress through the canal; accidents to machinery, propellers, steering gear, equipment, or anything else that may delay them or require assistance; any sickness or casualties that require medical attendance from canal officials; or any other matters of importance that may arise.

49. No charges will be imposed against the canal by vessels receiving or sending messages in relation to canal business.¹

50. No vessel will be allowed to communicate with any lock or signal station while in transit through the canal, except through the pilot; all messages of any kind must be sent through him. This does not apply to vessels moored at the terminals at Cristobal or Balboa, before entering or after having passed through the canal, which may wish to communicate through the terminal stations.

51. Vessels in transit through the canal can communicate with the locks and signal stations, through the pilots, both by the international code and special signals; information on this subject may be obtained from the governor of the Panama Canal.

52. *Accidents or defects.*—If any defect in any part of a vessel's hull, machinery, steering gear, or equipment be discovered while in transit through the canal, of such a serious nature that it might interfere with the further passage of the vessel or be liable to block the canal, the vessel shall stop and, if practicable, be anchored or moored at the first available place. A full report shall immediately be made to the superintendent of transportation,² through the captain of the port, stating fully the cause and nature of the trouble, probable delay, and request for assistance if it be necessary.

53. Under any and all circumstances, whenever a vessel is liable to become unmanageable from any weakness, or damage to her machinery, steering gear, or for any other reason, she shall immediately, through the pilot, request the assistance of a tug.

54. *Firearms.*—No firearms of any kind shall be discharged while in transit through the canal or in canal waters, and every precaution will be taken to prevent this.

55. *Subsistence of pilots.*—Pilots and other authorized persons on duty, belonging to the canal service, shall be subsisted without charge while on board vessels in transit through the canal.

56. *Maintenance of tugs and other floating equipment.*—No vessel, company, nor individual will be authorized to maintain or operate permanently any tugs, launches, lighters, or floating equipment of any kind within the canal waters

¹ Amended by Executive order of Nov. 4, 1914, to read: "No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on canal business."

² Title changed to marine superintendent.

without permission from the governor; nor shall any small craft or boat of any kind be operated without the proper authority from him.

118. In thick and foggy weather vessels will not be allowed to enter the canal or leave the locks or mooring station until the weather has cleared. Vessels in transit, when overtaken by thick or foggy weather, must immediately take every precaution and make preparation to anchor or moor at the first available place, and so remain until the weather clears. Vessels equipped with radio, when overtaken by thick or foggy weather, should immediately so report, in order that the proper fog signal may be made at the mooring stations on the approach of such vessels.

EXTRACT FROM SUPPLEMENT TO RULES—COMMERCIAL SERVICE AT NAVAL RADIO STATIONS.

[Dated Sept. 1, 1913.]

D. Beginning September 1, 1913, the radio stations of the United States Navy at Colon and Balboa are handling special classes of commercial radiograms, heretofore prohibited, as follows:

1. Reply paid messages (where both messages and answer can be prepaid by the sender).

2. Messages calling for repetition of messages (for verification only). Charge for repeating back is one-fourth the charge for the original message.

3. Radiograms to be delivered by mail. (If received from a ship, these will be mailed from the radio station. "Ocean letters" will be mailed by the ship at the first port of call, or at any port of call designated.)

4. Multiple radiograms. These are messages addressed either to several persons at same address, or to same person at several addresses served by the same radio station. These messages when received from sea will be separated and sent as so many individual messages over the land wire.

5. Radiograms calling for acknowledgment of receipt. (Such acknowledgment is restricted to notification of date and hour at which the coast station delivered the radiogram to ship addressed, and may be sent by either mail or telegraph.)

6. Paid service notices. (Sent in order to correct address or text, to cancel a message, etc.)

Both stations—Colon and Balboa—are connected by direct wire with the Panama railroad telephone system and radiograms can be filed at any local office. Attention is invited to the fact that no collect messages are handled, and no commercial messages are handled between stations which are connected by cable or telegraph, as, for instance, to Key West or Port Limon.

The time of arrival of all Panama railroad boats is given to the telephone central at Colon as soon as received, and can be obtained there upon request without calling the radio station at Colon.

EXECUTIVE ORDER—WIRELESS APPARATUS ON OCEAN-GOING VESSELS.

[Published in circular No. 601-16, dated Culebra, Canal Zone, July 23, 1914.]

E. To require ocean-going vessels to be fitted with wireless apparatus.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

SECTION 1. From and after the first day of July, 1915, it shall be unlawful for any ocean-going steamer of the United States, or of any foreign country, carrying 50 or more persons, including passengers and crew, to leave or attempt to leave any port of the Canal Zone unless such steamer shall be equipped with an efficient apparatus for radio communication in good working order in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages for a distance of at least 100 miles, night or day: *Provided*, That the provisions of this order shall not apply to steamers plying only between the Canal Zone and ports less than 200 miles therefrom.

SEC. 2. The master or other person being in charge of such vessel which leaves or attempts to leave any port of the Canal Zone in violation of any of the provisions of this order shall, upon conviction, be fined in a sum not to exceed

five thousand dollars (\$5,000), and any such fine shall be a lien upon such vessel, and the vessel may be liable therefor in the District Court of the Canal Zone, and the leaving or attempting to leave by any vessel from each and every port of the Canal Zone shall constitute a separate offense.

SEC. 3. This order shall take effect from and after this date. July 9, 1914.

EXECUTIVE ORDER—FREE RADIO SERVICE FOR CANAL BUSINESS.

[Published in circular No. 601-33, dated Balboa Heights, Canal Zone, Nov. 17, 1914.]

F. Amending paragraph 49 of the "Rules and regulations for the operation and navigation of the Panama Canal and approaches thereto, including all waters under its jurisdiction."

By virtue of the authority vested in me under the Panama Canal act, paragraph 49 of the "Rules and regulations for the operation and navigation of the Panama Canal and approaches thereto, including all waters under its jurisdiction," promulgated by Executive order No. 1990, dated July 9, 1914, is hereby amended to read as follows:

49. No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on canal business.

NOTICE TO MARINERS—SUSPENSION OF RADIO SERVICE IN CANAL-ZONE WATERS.

[Published in circular No. 643-38, dated from Balboa Heights, Canal Zone, May 12, 1917.]

G. For the information of ships' masters, it is desired to explain the cause of the general suspension of radio (wireless) service in Canal Zone ports. The objects are to protect merchant ships from capture and to leave the air free for radio orders to warships. All merchant ships should avoid the use of radio as much as possible for the reason that to a ship properly equipped it gives accurate indication of the bearing and distance of a ship sending out radio messages. The Canal Zone radio stations have orders not to exchange messages with merchant ships, although an exception is made when a ship arrives off the entrance to either terminal port, at which time she is permitted to notify the captain of the port, by radio, of her arrival. Thereafter, while in Canal Zone waters, she is forbidden to use radio except as directed by the pilot in communicating with Canal Zone officials on Government business.

EXTRACT FROM SUPPLEMENT TO RULES.

[Dated May 23, 1917.]

H. RULE 12.—The radio installation of any public or private vessel or of any auxiliary vessel of a belligerent, other than the United States, shall be used only in connection with the canal business to the exclusion of all other business while within the waters of the Canal Zone, including the waters of Colon and Panama Harbors.

BRITISH HONDURAS.

[Clipping from Year Book of Wireless Telegraphy, 1918.]

The Crown colony of British Honduras lies in Central America within 18° 29' 5" to 15° 53' 55" north latitude and 89° 9' 22" to 88° 10' west longitude. Its extreme length and breadth are 174 miles and 68 miles, respectively; it abuts on the Atlantic and is bounded on the north by Yucatan (Mexico), on the west and south by Guatemala, and on the east by the Caribbean Sea. The total area is about 8,598 square miles.

Wireless telegraphy has seen some developments here since its first introduction, and both the ownership and working of the radiotelegraphic stations are vested in the Government. The administration of wireless telegraphy is carried out under the following regulations:

A. Consolidated law.

B. Schedule.

Wireless telegraphy in British Honduras is regulated by Chapter CXIX of the Consolidated Laws of British Honduras (revised edition); the text of which will be found below.

CHAPTER CXCIX OF THE CONSOLIDATED LAWS OF BRITISH HONDURAS (REVISED EDITION)—TO REGULATE WIRELESS TELEGRAPHY.

A. 1. *Interpretation.*—In this chapter "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: *Provided*, That nothing in this ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *License to install, etc., wireless telegraphic apparatus.*—(1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place or on board any ship registered in the colony except under and in accordance with a license granted in that behalf by the governor.

(2) Every such license shall be in such form and for such period as the governor may determine and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

3. *Apparatus not to be worked on merchant ship except in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the colony, otherwise than in accordance with regulations under this chapter.

4. *Regulations.*—(1) The governor may from time to time make regulations for carrying into effect the purposes of this chapter, and such regulations shall on publication in the Gazette have the same effect as if enacted in this chapter.

(2) The regulations in the schedule to this chapter shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the colony shall be subject to such further regulations as may be made by the governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search warrants.*—If a district commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a license in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship contrary to the provisions of this chapter or of any regulations made under this chapter, or of any license granted under this chapter, he may grant a search warrant to any police officer or any person appointed in that behalf by the superintendent of police and named in the warrant, and a warrant so granted shall authorize the police officer or person named therein to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalty for contravention of chapter.*—(1) Any person who shall offend against any provision of this chapter or any regulations made thereunder shall be liable on summary conviction for every such offense to a fine not exceeding \$250, and upon such conviction the court may order that any apparatus for wireless telegraphy in connection with which the offense was committed shall be seized and forfeited.

(2) *Procedure.*—Proceedings shall be taken before the district commissioner for the Belize district on the complaint of the superintendent of police or of any person thereto authorized by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offenses punishable on summary conviction.

SCHEDULE—SEC. 4 (2)—REGULATIONS.

B. 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the colony shall be worked in such a way as not to interfere with—

(a) Naval signaling, or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with

the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these regulations "naval signaling" means signaling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbor or bay of the colony except with the special or general permission of the governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorized and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offense is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

MEXICO.

Occupying an important position in the southern part of the continent of North America, with an extensive seaboard both on the Atlantic and Pacific Oceans, Mexico stretches from 15° 0' to 32° 30' north latitude, and lies between 87° 0' and 117° 0' west longitude. It covers an area of 768,883 square miles, and comprises 27 states and three territories, besides the Federal District of Mexico.

As will be seen by reference to our "Land stations" section, Mexico contains a number of wireless installations; but owing to the period of internecine strife through which the country has passed during recent years, it is not possible under present conditions to print in these pages any legislative enactments or sets of rules governing their administration.

[Translation from Mexican Constitution of 1917].

ARTICLE 28. There shall be no private nor governmental monopolies of any kind whatsoever in the United States of Mexico; nor exemption from taxation; nor any prohibition even under cover of protection to industry, excepting only those relating to the coinage of money, to the postal, telegraphic, and radiotelegraphic services, to the issuance of bills by a single banking institution to be controlled by the Federal Government, and to the privileges which for a limited period the law may concede to authors and artists for the reproduction of their work; and lastly to those granted inventors or improvers of inventions for the exclusive use of their inventions.

The law will accordingly severely punish and the authorities diligently prosecute any accumulating or cornering by one or more persons of necessities for the purpose of bringing about a rise in price; any act or measure which shall stifle or endeavor to stifle free competition in any production, industry, trade, or public service; any agreement or combination of any kind entered into by producers, manufacturers, merchants, common carriers, or other public or quasi public service, to stifle competition and to compel the consumer to pay exorbitant prices; and in general whatever constitutes an unfair and exclusive advantage in favor of one or more specified person or persons to the detriment of the public in general or of any special class of society.

Associations of labor organized to protect their own interests shall not be deemed a monopoly. Nor shall cooperative associations or unions of producers be deemed monopolies when, in defense of their own interests or of the general public, they sell directly in foreign markets national or industrial products which are the principal source of wealth of the region in which they are produced, provided they be not necessities, and provided further that such associations be under the supervision or protection of the Federal Govern-

ment or of that of the State, and provided further that authorization be in each case obtained from the respective legislative bodies. These legislative bodies may, either on their own initiative or on the recommendation of the executive, revoke, whenever the public interest shall so demand, the authorization granted for the establishment of the associations in question.

NICARAGUA.

[Clipping from Year Book of Wireless Telegraphy, 1918.]

This Central American State lies between Costa Rica on the south and Honduras on the north. Its area is estimated at 49,200 square miles, and it possesses a coast line of about 300 miles on the Atlantic, while that on the Pacific Ocean stretches for about 200 miles.

The present constitution came into force on April 5, 1913. It vests the executive functions in a president, and the legislative power in a congress of two houses. On February 18, 1916, a treaty between Nicaragua and the United States was ratified, which laid down the conditions for the acquisition by the latter of naval bases on the Pacific and Atlantic coasts, and of the projected canal route.

With regard to wireless telegraphy, none of the installations at present existing in Nicaragua are owned by the Government. The United States Government possess a station in Managua, the capital of the Republic, and there are two stations owned by private companies on the Atlantic coast. These stations (with the exception of that owned by the American Government) have been erected under contract with the Government of the Republic, and are subject to the provisions of the London Radiotelegraphic Convention of 1912.

The control of any stations which the Government might establish on its own account would be vested in the minister of progress and public works (Ministerio de Fomento) and the postmaster general. No special legislation bearing on the subject has, however, been promulgated in the country. The above-mentioned convention constitutes the only law at present applicable to Nicaragua in the case of wireless telegraphy.

[Translation from the constitution.]

ARTICLE 61. All private monopoly is prohibited.

Under the law of Nicaragua telegraph and telephone lines and radio stations are established under special concessions granted by the Government. No telephone, telegraph, or radio apparatus may be brought into the country except by special permission.

SAN SALVADOR (REPUBLIC OF).

[Clipping from Year Book of Wireless Telegraphy, 1918.]

The Independent Republic of San Salvador originated in the course of dissolution of the Central American Federation (Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica), which took place in 1839. Its constitution dates from 1824 (during federation days) and has been modified on various occasions, ranging from 1859 to 1886. The President directs the executive, whose legislative functions are exercised by a Congress annually elected under universal suffrage. The 14 Provinces, of which San Salvador is composed, possess a total area estimated at 13,176 square miles. The capital city possesses the same name as the Republic.

The consular report made by the United States Consul-General, published on August 21, 1911, contains the following clause:

"Wireless stations have been installed at La Libertad and Lomas de Candalaria, the latter on a mountain ridge several miles from San Salvador, to which messages are now relayed by telegraph, although the ultimate plans embrace a station here as well. The tests having proved satisfactory, the Government will install an apparatus capable of maintaining communications with Bluefields (Nicaragua) and Limon (Costa Rica)."

The station at La Libertad was withdrawn as communication with ships at sea can easily be maintained by the installation now working at Lomas de Candelaria.

The prognostications of the United States consul general were fulfilled this year, and close by the city of San Salvador at a place known as Finca Modelo there was erected in May, 1917, a wireless station presented by Senor Carranza, the Mexican President.

At the time of going to press we were not in receipt of the text of any laws and regulations affecting radiotelegraphy in this Republic.

[Translation from the constitution.]

ARTICLE 34. All industrial enterprises are open to all, and only spirits, salt-peter, and gunpowder may be monopolized for the benefit of the nation and administered by the national executive.

There can not be monopoly of any kind nor prohibition from engaging in any business under pretext of protecting the industry. The only exceptions to this shall be in the matter of coining money and the special privileges for limited periods which the law concedes to inventors and those who make improvements in industrial processes.

COSTA RICA.

[Translation from the Fiscal Code, Law of Telegraphs, Chapter I. General Regulations.]

ARTICLE 369. Besides the national telegraph lines now established or which may in future be established, there may be others of private ownership in accordance with concessions which may be granted for that purpose by Congress.

RADIO COMMUNICATION LAWS OF THE UNITED STATES AND THE INTERNATIONAL RADIOTELEGRAPHIC CONVENTION, TOGETHER WITH REGULATIONS GOVERNING RADIO OPERATORS AND THE USE OF RADIO APPARATUS ON SHIPS AND ON LAND.

[Prepared by the Bureau of Navigation, Department of Commerce.]

Part I.—RADIO COMMUNICATION LAWS AND INTERNATIONAL TREATIES.

AN ACT Approved July 23, 1912, amending section 1 of an act entitled "An act to require apparatus and operators for radio communication on certain ocean steamers," approved June 24, 1910.¹

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. * * *

SECTION 1. That from and after October first, nineteen hundred and twelve, it shall be unlawful for any steamer of the United States or of any foreign country navigating the ocean or the Great Lakes and licensed to carry, or carrying, fifty or more persons, including passengers or crew or both, to leave or attempt to leave any port of the United States unless such steamer shall be equipped with an efficient apparatus for radio communication, in good working order, capable of transmitting and receiving messages over a distance of at least one hundred miles, day or night. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable the sending set for at least four hours to send messages over a distance of at least one hundred miles, day or night, and efficient communication between the operator in the radio room and the bridge shall be maintained at all times.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every willful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.

¹ The amended act applies to vessels licensed to carry as well as those actually carrying 50 or more persons, etc.

That the provisions of this section shall not apply to steamers plying between ports, or places, less than two hundred miles apart.

SEC. 2. That this act, so far as it relates to the Great Lakes, shall take effect on and after April first, nineteen hundred and thirteen, and so far as it relates to ocean cargo steamers shall take effect on and after July first, nineteen hundred and thirteen: *Provided*, That on cargo steamers, in lieu of the second operator provided for in this act there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The remaining sections of the act of June 24, 1910, which are unchanged, read as follows:

SEC. 2. That for the purpose of this act apparatus for radio communication shall not be deemed to be efficient unless the company installing it shall contract in writing to exchange, and shall, in fact, exchange, as far as may be physically practicable, to be determined by the master of the vessel, messages with shore or ship stations using other systems of radio communication.

SEC. 3. That the master or other person being in charge of any such vessel which leaves or attempts to leave any port of the United States in violation of any of the provisions of this act shall, upon conviction, be fined in a sum not more than five thousand dollars, and any such fine shall be a lien upon such vessel, and such vessel may be libeled therefor in any district court of the United States within the jurisdiction of which such vessel shall arrive or depart, and the leaving or attempting to leave each and every port of the United States shall constitute a separate offense.

SEC. 4. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this act by collectors of customs and other officers of the Government.

[PUBLIC—No. 264.]

[S. 6412.]

AN ACT To regulate radio communication, approved August 13, 1912.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce upon application therefor; but nothing in this act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided*, That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a license shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2. That every such license shall be in such form as the Secretary of Commerce shall determine and shall contain the restrictions, pursuant to this act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location

of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this act or subsequent acts and treaties of the United States. Every such license shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

SEC. 3. That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this act or subsequent acts or treaties of the United States, or any of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said license for a period to be fixed by the Secretary of Commerce not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offense: *Provided*, That in case of emergency the Secretary of Commerce may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship act of June twenty-fourth, nineteen hundred and ten.

SEC. 4. That for the purpose of preventing or minimizing interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of the distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce may grant special temporary licenses to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

NORMAL WAVE LENGTH.

First. Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed six hundred meters or it shall exceed one thousand six hundred meters. Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided,

and every coast station open to general public service shall be prepared to use two sending wave lengths, one of three hundred meters and one of six hundred meters, as required by the international convention in force: *Provided*, That the Secretary of Commerce may, in his discretion, change the limit of wave length reservation made by regulations first and second to accord with any international agreement to which the United States is a party.

OTHER WAVE LENGTHS.

Second. In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths: *Provided*, That they do not exceed six hundred meters or that they do exceed one thousand six hundred meters: *Provided further*, That the character of the waves emitted conforms to the requirements of regulations third and fourth following.

USE OF A "PURE WAVE."

Third. At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed 10 per cent of that in the greatest.

USE OF A "SHARP WAVE."

Fourth. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

USE OF "STANDARD DISTRESS WAVE."

Fifth. Every station on shipboard shall be prepared to send distress calls on the normal wave length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave length.

SIGNAL OF DISTRESS.

Sixth. The distress call used shall be the international signal of distress

USE OF "BROAD INTERFERING WAVE" FOR DISTRESS SIGNALS.

Seventh. When sending distress signals the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

DISTANCE REQUIREMENT FOR DISTRESS SIGNALS.

Eighth. Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations fifth and sixth with sufficient power to enable them to be received by day oversea a distance of one hundred nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

"RIGHT OF WAY" FOR DISTRESS SIGNALS.

Ninth. All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

REDUCED POWER FOR SHIPS NEAR A GOVERNMENT STATION.

Tenth. No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

INTERCOMMUNICATION.

Eleventh. Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period not less than two minutes, with the receiver tuned to receive messages of three hundred meter wave lengths.

DIVISION OF TIME.

Twelfth. At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations can not be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

GOVERNMENT STATIONS TO OBSERVE DIVISION OF TIME.

Thirteenth. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

USE OF UNNECESSARY POWER.

Fourteenth. In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

GENERAL RESTRICTIONS ON PRIVATE STATIONS.

Fifteenth. No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding two hundred meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce contained in the license of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of one hundred dollars or twenty-five dollars, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

SPECIAL RESTRICTIONS IN THE VICINITIES OF GOVERNMENT STATIONS.

Sixteenth. No station of the character mentioned in regulation fifteenth situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding 200 meters or a transformer input exceeding one-half kilowatt.

SHIP STATIONS TO COMMUNICATE WITH NEAREST SHORE STATIONS.

Seventeenth. In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this can not be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

LIMITATIONS FOR FUTURE INSTALLATIONS IN VICINITIES OF GOVERNMENT STATIONS.

Eighteenth. No station on shore not in actual operation at the date of the passage of this act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations, to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of nineteen hundred and six and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of nineteen hundred and six and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within one hundred nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

SECRECY OF MESSAGES.

Nineteenth. No person or persons engaged in or having knowledge of the operation of any station or stations shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorized agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punished by a fine of not more than two hundred and fifty dollars or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

PENALTIES.

For violation of any of these regulations, subject to which a license under sections one and two of this act may be issued, the owner of the apparatus shall be liable to a penalty of one hundred dollars, which may be reduced or remitted by the Secretary of Commerce, and for repeated violations of any of such regulations the license may be revoked.

For violation of any of these regulations, except as provided in regulation nineteenth, subject to which a license under section three of this act may be

issued, the operator shall be subject to a penalty of twenty-five dollars, which may be reduced or remitted by the Secretary of Commerce, and for repeated violations of any such regulations the license shall be suspended or revoked.

SEC. 5. That every license granted under the provisions of this act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not willfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

SEC. 6. That the expression "radio communication" as used in this act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

SEC. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

SEC. 8. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections four and seven of this act and so much of section five as imposes a penalty for interference. Save as aforesaid, nothing in this act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9. That the trial of any offense under this act shall be in the district in which it is committed, or if the offense is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10. That this act shall not apply to the Philippine Islands.

SEC. 11. That this act shall take effect and be in force on and after four months from its passage.

Approved, August 13, 1912.

LONDON INTERNATIONAL RADIOTELEGRAPHIC CONVENTION, PROCLAIMED BY THE PRESIDENT JULY 8, 1913.

The International Radiotelegraphic Convention was signed at London July 5, 1912. The convention was ratified by the Senate of the United States on January 22, 1913, with the proviso set forth in the following resolution of concurrence:

"Resolved (two-thirds of the Senators present concurring therein). That the Senate advise and consent to the ratification of the radiotelegraphic convention signed at London on July 5, 1912, with the final protocol and service regulations connected therewith: Provided, That the Senate advise and consent to the ratification of said convention with the understanding to be expressed as a part of the instrument of ratification that nothing in the Ninth Article of the Regulations affixed to the convention shall be deemed to exclude the United States from the execution of her inspection laws upon vessels entering in or clearing from her ports."

The London Convention was proclaimed by the President, and took effect July 8, 1913, "to the end that the same and every article and clause thereof may be observed and fulfilled with good faith by the United States and the citizens thereof," and supersedes the Berlin Radiotelegraphic Convention.

The London Convention and Regulations do not modify or repeal the act of August 13, 1912, to regulate radio communication or the acts of June 24, 1910, and July 23, 1912, to require apparatus and operators for radio communication on certain ocean steamers.

INTERNATIONAL RADIOTELEGRAPH CONVENTION, LONDON, 1912.

[Translation.]

International Radiotelegraph Convention concluded between Germany and the German Protectorates, the United States of America and the Possessions of the United States of America, the Argentine Republic, Austria, Hungary, Bosnia-Herzegovina, Belgium, the Belgian Congo, Brazil, Bulgaria, Chile, Denmark, Egypt, Spain and the Spanish Colonies, France and Algeria, French West Africa, French Equatorial Africa, Indo-China, Madagascar, Tunis, Great Britain and the various British Colonies and Protectorates, the Union of South Africa, the Australian Federation, Canada, British India, New Zealand, Greece, Italy and the Italian Colonies, Japan and Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung, Morocco, Monaco, Norway, the Netherlands, the Dutch Indies and the Colony of Curacao, Persia, Portugal and the Portuguese Colonies, Roumania, Russia and the Russian Possessions and Protectorates, The Republic of San Marino, Siam, Sweden, Turkey, and Uruguay.

The undersigned, plenipotentiaries of the Governments of the countries enumerated above, having met in conference at London, have agreed on the following Convention, subject to ratification:

ARTICLE 1.

The High Contracting Parties bind themselves to apply the provisions of the present Convention to all radio stations (both coastal stations and stations on shipboard) which are established or worked by the Contracting Parties and open to public service between the coast and vessels at sea.

They further bind themselves to make the observance of these provisions obligatory upon private enterprises authorized either to establish or work coastal stations for radiotelegraphy open to public service between the coast and vessels at sea, or to establish or work radio stations, whether open to general public service or not, on board of vessels flying their flag.

ARTICLE 1.

By "coastal station" is to be understood every radio station established on shore or on board a permanently moored vessel used for the exchange of correspondence with ships at sea.

Every radio station established on board any vessel not permanently moored is called a "station on shipboard."

ARTICLE 3.

The coastal stations and the stations on shipboard shall be bound to exchange radiograms without distinction of the radio system adopted by such stations.

Every station on shipboard shall be bound to exchange radiograms with every other station on shipboard without distinction of the radio system adopted by such stations.

However, in order not to impede scientific progress, the provisions of the present Article shall not prevent the eventual employment of a radio system incapable of communicating with other systems, provided that such incapacity shall be due to the specific nature of such system and that it shall not be the result of devices adopted for the sole purpose of preventing intercommunication.

ARTICLE 4.

Notwithstanding the provisions of Article 3, a station may be reserved for a limited public service determined by the object of the correspondence or by other circumstances independent of the system employed.

ARTICLE 5.

Each of the High Contracting Parties undertakes to connect the coastal stations to the telegraph system by special wires, or, at least, to take other measures which will insure a rapid exchange between the coastal stations and the telegraph system.

ARTICLE 6.

The High Contracting Parties shall notify one another of the names of coastal stations and stations on shipboard referred to in Article 1, and also of all data, necessary to facilitate and accelerate the exchange of radiograms, as specified in the Regulations.

ARTICLE 7.

Each of the High Contracting Parties reserves the right to prescribe or permit at the stations referred to in Article 1, apart from the installation the data of which are to be published in conformity with Article 6, the installation and working of other devices for the purpose of establishing special radio communication without publishing the details of such devices.

ARTICLE 8.

The working of the radio stations shall be organized as far as possible in such manner as not to disturb the service of other radio stations.

ARTICLE 9.

Radio stations are bound to give absolute priority to calls of distress from whatever source, to similarly answer such calls and to take such action with regard thereto as may be required.

ARTICLE 10.

The charge for a radiogram shall comprise, according to the circumstances:

1. (a) The coastal rate, which shall fall to the coastal station;
- (b) The shipboard rate, which shall fall to the shipboard station.
2. The charge for transmission over the telegraph lines, to be computed according to the ordinary rules.
3. The charges for transit through the intermediate coastal or shipboard stations and the charges for special services requested by the sender.

The coastal rate shall be subject to the approval of the Government of which the coastal station is dependent, and the shipboard rate to the approval of the Government of which the ship is dependent.

ARTICLE 11.

The provisions of the present Convention are supplemented by Regulations, which shall have the same force and go into effect at the same time as the Convention.

The provisions of the present Convention and of the Regulations relating thereto may at any time be modified by the High Contracting Parties by common consent. Conference of plenipotentiaries having power to modify the Convention and Regulations, shall take place from time to time; each conference shall fix the time and place of the next meeting.

ARTICLE 12.

Such conferences shall be composed of delegates of the Governments of the contracting countries.

In the deliberations each country shall have but one vote.

If a Government adheres to the Convention for its colonies, possessions or protectorates, subsequent conferences may decide that such colonies, possessions or protectorates, or a part thereof, shall be considered as forming a country as regards the application of the preceding paragraph. But the number of votes at the disposal of one Government, including its colonies, possessions or protectorates, shall in no case exceed six.

The following shall be considered as forming a single country for the application of the present Article:

German East Africa
German Southwest Africa
Kamerun
Togo Land
German Protectorates in the Pacific

Alaska
 Hawaii and the other American possessions in Polynesia
 The Philippine Islands
 Porto Rico and the American possessions in the Antilles.
 The Panama Canal Zone
 The Belgian Congo
 The Spanish Colony of the Gulf of Guinea
 French East Africa
 French Equatorial Africa
 Indo-China
 Madagascar
 Tunis
 The Union of South Africa
 The Australian Federation
 Canada
 British India
 New Zealand
 Eritrea
 Italian Somaliland
 Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung.
 The Dutch Indies
 The Colony of Curacao
 Portuguese West Africa
 Portuguese East Africa and the Portuguese possessions in Asia
 Russian Central Asia (littoral of the Caspian Sea)
 Bokhara
 Khiva
 Western Siberia (littoral of the Arctic Ocean).
 Eastern Siberia (littoral of the Pacific Ocean).

ARTICLE 13.

The International Bureau of the Telegraph Union shall be charged with collecting, coordinating and publishing information of every kind relating to radiotelegraphy, examining the applications for changes in the Convention or Regulations, promulgating the amendments adopted, and generally performing all administrative work referred to it in the interest of international radiotelegraphy.

The expense of such institution shall be borne by all the contracting countries.

ARTICLE 14.

Each of the High Contracting Parties reserves to itself the right of fixing the terms on which it will receive radiograms proceeding from or intended for any station, whether on shipboard or coastal, which is not subject to the provisions of the present Convention.

If a radiogram is received the ordinary rates shall be applicable to it.

Any radiogram proceeding from a station on shipboard and received by a coastal station of a contracting country, or accepted in transit by the administration of a contracting country, shall be forwarded.

Any radiogram intended for a vessel shall also be forwarded if the administration of the contracting country has accepted it originally or in transit from a non-contracting country, the coastal station reserving the right to refuse transmission to a station on shipboard subject to a non-contracting country.

ARTICLE 15.

The provisions of Articles 8 and 9 of this Convention are also applicable to radio installation other than those referred to in Article 1.

ARTICLE 16.

Governments which are not parties to the present Convention shall be permitted to adhere to it upon their request. Such adherence shall be communicated through diplomatic channels to the contracting Government in whose territory the last conference shall have been held, and by the latter to the remaining Governments.

The adherence shall carry with it to the fullest extent acceptance of all the clauses of this Convention and admission to all the advantages stipulated therein.

The adherence to the Convention by the Government of a country having colonies, possessions or protectorates shall not carry with it the adherence of its colonies, possessions or protectorates unless a declaration to that effect is made by such Government. Such colonies, possessions and protectorates, as a whole or each of them, separately, may form the subject of a separate adherence or a separate denunciation within the provisions of the present Article and of Article 22.

ARTICLE 17.¹

The provisions of Articles 1, 2, 3, 5, 6, 7, 8, 11, 12 and 17 of the International Telegraph Convention of St. Petersburg of July 10-22, 1875, shall be applicable to international radiotelegraphy.

ARTICLE 18.

In case of disagreement between two or more contracting Governments regarding the interpretation or execution of the present Convention or of the Regulations referred to in Article 11, the question in dispute may, by mutual agreement, be submitted to arbitration. In such case each of the Governments concerned shall choose another Government not interested in the question at issue.

The decision of the arbiters shall be arrived at by the absolute majority of votes.

In case of a division of votes, the arbiters shall choose, for the purpose of settling the disagreement, another contracting Government which is likewise a stranger to the question at issue. In case of failure to agree on a choice, each arbiter shall propose a disinterested contracting Government and lots shall be drawn between the Governments proposed. The drawing of the lots shall fall to the Government within whose territory the international bureau provided for in Article 13 shall be located.

ARTICLE 19.

The High Contracting Parties bind themselves to take, or propose to their respective legislatures, the necessary measures for insuring the execution of the present Convention.

ARTICLE 20.

The High Contracting Parties shall communicate to one another any laws already framed, or which may be framed, in their respective countries relative to the object of the present Convention.

ARTICLE 21.

The High Contracting Parties shall preserve their entire liberty as regards radio installations other than provided for in Article 1, especially naval and military installations, and stations used for communications between fixed points. All such installations and stations shall be subject only to the obligations provided for in Articles 8 and 9 of the present Convention.

However, when such installations and stations are used for public maritime service they shall conform, in the execution of such service, to the provisions of the Regulations as regards the mode of transmission and rates.

On the other hand, if coastal stations are used for general public service with ships at sea and also for communication between fixed points, such stations shall not be subject, in the execution of the last named service, to the provisions of the Convention except for the observance of Articles 8 and 9 of this Convention.

Nevertheless, fixed stations used for correspondence between land and land shall not refuse the exchange of radiograms with another fixed station on

¹ See translation of articles of the International Telegraph Convention.

account of the system adopted by such station; the liberty of each country shall, however, be complete as regards the organization of the service for correspondence between fixed points and the nature of the correspondence to be effected by the stations reserved for such service.

ARTICLE 22.

The present Convention shall go into effect on the 1st day of July, 1913, and shall remain in force for an indefinite period or until the expiration of one year from the day when it shall be denounced by any of the contracting parties.

Such denunciation shall affect only the Government in whose name it shall have been made. As regards the other Contracting Powers, the Convention shall remain in force.

ARTICLE 23.

The present Convention shall be ratified and the ratifications exchanged at London with the least possible delay.

In case one or several of the High Contracting Parties shall not ratify the Convention, it shall nevertheless be valid as to the Parties which shall have ratified it.

In witness whereof the respective plenipotentiaries have signed one copy of the Convention, which shall be deposited in the archives of the British Government, and a copy of which shall be transmitted to each Party.

Done at London, July 5, 1912.

[Translation.]

FINAL PROTOCOL.

At the moment of signing the Convention adopted by the International Radiotelegraph Conference of London, the undersigned plenipotentiaries have agreed as follows:

I.

The exact nature of the adherence notified on the part of Bosnia-Herzegovina not yet being determined, it is recognized that one vote shall be assigned to Bosnia-Herzegovina but that a decision will be necessary at a later date as to whether this vote belongs to Bosnia-Herzegovina in virtue of the second paragraph of Article 12 of the Convention, or whether this vote is accorded to it in conformity with the provisions of the third paragraph of that article.

II.

Note is taken of the following declaration:

The Delegation of the United States declares that its government is under the necessity of abstaining from all action with regard to rates, because the transmission of radiograms as well as of ordinary telegrams in the United States is carried on, wholly or in part, by commercial or private companies.

III.

Note is likewise taken of the following declaration:

The Government of Canada reserves the right to fix separately, for each of its coastal stations, a total maritime rate for radiograms proceeding from North America and destined for any ship whatever, the coastal rate amounting to three-fifths and the shipboard rate to two-fifths of the total rate.

In witness whereof the respective plenipotentiaries have drawn up the present Final Protocol, which shall be of the same force and effect as though the provisions thereof had been embodied in the text of the Convention itself to which it has reference, and they have signed one copy of the same, which shall be deposited in the archives of the British Government, and a copy of which shall be transmitted to each of the Parties.

Done at London, July 5, 1912.

SERVICE REGULATIONS AFFIXED TO THE INTERNATIONAL RADIOTELEGRAPH CONVENTION, LONDON, 1912.

[Translation.]

ORGANIZATION OF RADIO STATIONS.

ARTICLE I.

The choice of radio apparatus and devices to be used by the coastal stations and stations on shipboard shall be unrestricted. The installation of such stations shall as far as possible keep pace with scientific and technical progress.

ARTICLE II.

Two wave lengths, one of 600 meters and the other of 300 meters, are authorized for general public service. Every coastal station opened to such service shall be equipped in such manner as to be able to use these two wave lengths, one of which shall be designated as the normal wave length of the station. During the whole time that a coastal station is open it shall be in condition to receive calls according to its normal wave length. For the correspondence specified under paragraph 2 of Article XXXV, however, a wave length of 1,800 meters shall be used. In addition, each Government may authorize in coastal stations the employment of other wave lengths designed to insure long-range service or any service other than for general public correspondence established in conformity with the provisions of the Convention under the reservation that such wave lengths do not exceed 600 meters or that they do exceed 1,600 meters.

In particular, stations used exclusively for sending signals designed to determine the position of ships shall not employ wave lengths exceeding 150 meters.

ARTICLE III.

1. Every station on shipboard shall be equipped in such manner as to be able to use wave lengths of 600 meters and of 300 meters. The first shall be the normal wave length and may not be exceeded for transmission except in the case referred to under Article XXXV (paragraph 2).

Other wave lengths, less than 600 meters, may be used in special cases and under the approval of the managements to which the coastal and shipboard stations concerned are subject.

2. During the whole time that a station on shipboard is open it shall be able to receive calls according to its normal wave length.

3. Vessels of small tonnage which are unable to use a wave length of 600 meters for transmission, may be authorized to employ exclusively the wave length of 300; they must be able to receive a wave length of 600 meters.

ARTICLE IV.

Communication between a coastal station and a station on shipboard shall be exchanged on the part of both by means of the same wave length. If, in a particular case, communication is difficult, the two stations may, by mutual consent, pass from the wave length with which they are communicating to the other regulation wave length. Both stations shall resume their normal wave length when the exchange of radiograms is finished.

ARTICLE V.

1. The International Bureau shall draw up, publish, and revise from time to time an official chart showing the coastal stations, their normal ranges, the principal lines of navigation, and the time normally taken by ships for the voyage between the different ports of call.

2. It shall draw up and publish a list of radio stations of the class referred to in Article I of the convention, and from time to time supplements covering additions and modifications. Such list shall contain for each station the following data:

(1) In the case of coastal stations: Name, nationality, and geographical location indicated by the territorial subdivision and the latitude and longitude of

the place. In the case of stations on shipboard: Name and nationality of the ship. When the case arises, the name and address of the party working the station.

(2) The call letters (the calls shall be distinguishable from one another and each must be formed of a group of three letters).

(3) The normal range.

(4) The radio system with the characteristics of the transmitting system (musical sparks, tonality expressed by the number of double vibrations, etc.).

(5) The wave lengths used (the normal wave length to be underscored).

(6) The nature of the services carried on.

(7) The hours during which the station is open.

(8) When the case arises, the hour and method of transmitting time signals and meteorological telegrams.

(9) The coastal rate or shipboard rate.

3. The list shall also contain data relating to radio stations other than those specified in Article I of the convention as may be communicated to the International Bureau by the management of the Radio Service ("administration") to which such stations are subject, provided that such managements are either adherents to the convention or, if not adherents, have made the declaration referred to in Article XLVIII.

4. The following notations shall be adopted in documents for use by the International Service to designate radio stations:

PG station open to general public correspondence.

PR station open to limited public correspondence.

P station of private interest.

O station open exclusively to official correspondence.

N station having continuous service.

X station having no fixed working hours.

5. The name of a station on shipboard appearing in the first column of the list shall be followed, in case there are two or more vessels of the same name, by the call letters of such station.

ARTICLE VI.

The exchange of superfluous signals and words is prohibited to stations of the class referred to in Article I of the convention. Experiments and practice will be permitted in such stations in so far as they do not interfere with the service of other stations.

Practice shall be carried on with wave lengths different from those authorized for public correspondence, and with the minimum of power necessary.

ARTICLE VII.

1. All stations are bound to carry on the service with the minimum of energy necessary to insure safe communication.

2. Every coastal or shipboard station shall comply with the following requirements:

(a) The waves sent out shall be as pure and as little damped as possible;

In particular, the use of transmitting devices in which the waves sent out are obtained by means of sparks directly in the aerial (plain aerial) shall not be authorized except in cases of distress.

It may, however, be permitted in the case of certain special stations (those of small vessels for example) in which the primary power does not exceed 50 watts.

(b) The apparatus shall be able to transmit and receive at a speed equal to at least 20 words a minute, words to be counted at the rate of five letters each.

New installation using more than 50 watts shall be equipped in such a way as to make it possible to obtain with ease several ranges less than the normal range, the shortest being approximately 15 nautical miles. Existing installations using more than 50 watts shall be remodeled, wherever possible, so as to comply with the foregoing provisions.

(c) Receiving apparatus shall be able to receive, with the greatest possible protection against interference, transmissions of the wave lengths specified in the present Regulations, up to 600 meters.

3. Stations serving solely for determining the position of ships (radiophares) shall not operate over a radius greater than 30 nautical miles.

ARTICLE VIII.

Independently of the general requirements specified under Article VII, stations on shipboard shall likewise comply with the following requirements:

(a) The power transmitted to the radio apparatus, measured at the terminals of the generator of the station, shall not, under normal conditions, exceed one kilowatt.

(b) Subject to the provisions of Article XXXV, paragraph 2, power exceeding one kilowatt may be employed when the vessel finds it necessary to correspond while more than 200 nautical miles distant from the nearest coastal station, or when owing to unusual circumstances communication can be established only by means of an increase of power.

ARTICLE IX.

1. No station on shipboard shall be established or worked by private enterprise without a license issued by the Government to which the vessel is subject.

Stations on board of ships having their port of registry in a colony, possession, or protectorate may be described as subject to the authority of such colony, possession, or protectorate.

2. Every shipboard station holding a license issued by one of the contracting governments shall be considered by the other governments as having an installation fulfilling the requirements stipulated in the present regulations.

Competent authorities of the countries at which the ship calls may demand the production of the license. In default of such production, these authorities may satisfy themselves as to whether the radio installations of the ship fulfill the requirements imposed by the present regulations.

When the management of the radio service of a country is convinced by its working that a station on shipboard does not fulfill the requirements, it shall, in every case, address a complaint to the management of the radio service of the country to which such ship is a subject. The subsequent procedure, when necessary, shall be the same as that prescribed in Article XII, paragraph 2.

ARTICLE X.

1. The service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the government to which the vessel is subject, or, in case of necessity and for one voyage only, by some other adhering government.

2. There shall be two classes of certificates:

The first-class certificate shall attest the professional efficiency of the operator as regards:

(a) Adjustment of the apparatus and knowledge of its functioning;

(b) Transmission and acoustic reception at the rate of not less than 20 words a minute;

(c) Knowledge of the regulations governing the exchange of radio correspondence.

The second-class certificate may be issued to operators who are able to transmit and receive at a rate of only 12 to 19 words a minute, but who, in other respects, fulfill the requirements mentioned above. Operators holding second-class certificates may be permitted on:

(a) Vessels which use radiotelegraphy only in their own service and in the correspondence of their crews, fishing vessels in particular;

(b) All vessels as substitutes, provided such vessels have on board at least one operator holding a first-class certificate. However, on vessels classed under the first category indicated in Article XIII the service shall be carried on by at least two telegraph operators holding first-class certificates.

In the stations on shipboard transmissions shall be made only by operators holding first or second class certificates, except in cases of necessity, where it would be impossible to conform to this provision.

3. The certificate shall furthermore state that the Government has bound the operator with secrecy with regard to the correspondence.

4. The radio service of the station on shipboard shall be under the superior authority of the commanding officer of the ship.

ARTICLE XI.

Ships provided with radio installations and classed under the first two categories indicated in Article XIII are bound to have radio installations for distress calls, all the elements of which shall be kept under conditions of the greatest possible safety, to be determined by the Government issuing the license. Such emergency installations shall have their own source of energy, be capable of quickly being set in operation, of functioning for at least six hours, and have a minimum range of 80 nautical miles for ships of the first category and 50 miles for those of the second. Such emergency installations shall not be required in the case of vessels the regular installations of which fulfill the requirements of the present article.

ARTICLE XII.

If the management of the radio service of a country has knowledge of any infraction of the convention or of the regulations committed in any of the stations authorized by it, it shall ascertain the facts and fix the responsibility.

In the case of stations on shipboard, if the operator is responsible for such infraction, the management of the radio service shall take the necessary measures, and, if the necessity should arise, withdraw the certificate. If it is ascertained that the infraction is the result of the condition of the apparatus or of instructions given the operator, the same method shall be pursued with regard to the license issued to the vessel.

2. In cases of repeated infractions chargeable to the same vessel, if the representations made to the management of the country to which the vessel is subject by that of another country remain without effect, the latter shall be at liberty, after giving due notice, to authorize its coastal stations not to accept communications proceeding from the vessel at fault. In case of disagreement between the management of the radio service of two countries, the question shall be submitted to arbitration at the request of either of the two Governments concerned. The procedure is indicated in article 18 of the convention.

2. HOURS OF SERVICE OF STATIONS.

ARTICLE XIII.

(a) Coastal stations:

1. The service of coastal stations shall, as far as possible be constant, day and night, without interruption.

Certain coastal stations, however, may have a service of limited duration. The management of the radio service of each country shall fix the hours of service.

2. The coastal stations whose service is not constant shall not close before having transmitted all their radiograms to the vessels which are within their radius of action, nor before having received from such vessels all the radiograms of which notice has been given. This provision is likewise applicable when vessels signal their presence before the actual cessation of work.

(b) Stations on shipboard:

3. Stations on shipboard shall be classed under three categories:

- (1) Stations having constant service;
- (2) Stations having a service of limited duration;
- (3) Stations having no fixed working hours.

When the ship is under way the following shipboard stations shall have an operator constantly listening in: 1st, Stations of the first category; 2nd, Those of the second category during the hours in which they are open to service. During the remaining hours the last-named stations shall have an operator at the radio instrument listening in during the first ten minutes of each hour. Stations of the third category are not bound to perform any regular service of listening in.

It shall fall to the Governments issuing the licenses specified in Article IX to fix the category in which the ship shall be classed as regards its obligations in the matter of listening in. Mention shall be made of such classification in the license.

3. FORM AND POSTING OF RADIOGRAMS.

ARTICLE XIV.

1. Radiograms shall show, as the first word of the preamble, that the service is "radio."

2. In the transmission of radiograms proceeding from a ship at sea, the date and hour of posting at the shipboard station shall be stated in the preamble.

3. Upon forwarding a radiogram over the telegraph system the coastal station shall show thereon as the office of origin the name of the ship of origin as it appears in the list, and also when the case arises, that of the last ship which acted as intermediary. These data shall be followed by the name of the coastal station.

ARTICLE XV.

The address of radiograms intended for ships shall be as complete as possible.

It shall embrace the following:

- (a) The name or title of the addressee, with additional designations, if any;
- (b) The name of the vessel as it appears in the first column of the list;
- (c) The name of the coastal station as it appears in the list.

The name of the ship, however, may be replaced, at the sender's risk, by the designation of the route to be followed by such vessel, as determined by the names of the ports of departure and destination or by any other equivalent information.

2. In the address the name of the ship as it appears in the first column of the list shall in all cases and independently of its length be counted as one word.

3. Radiograms framed with the aid of the International Code of Signals shall be transmitted to their destination without being translated.

4. RATES.

ARTICLE XVI.

1. The coastal rate and the shipboard rate shall be fixed in accordance with the tariff per word, pure and simple, on the basis of an equitable remuneration for the radio work, with an optional minimum rate per radiogram.

The coastal rate shall not exceed 60 centimes (11.6 cents) a word, and the shipboard rate shall not exceed 40 centimes (7.7 cents) a word. However, each management shall be at liberty to authorize coastal and shipboard rates higher than such maxima in the case of stations of ranges exceeding 400 nautical miles, or of stations whose work is exceptionally difficult owing to physical conditions in connection with the installation or working of the same.

The optional minimum rate per radiogram shall not be higher than the coastal rate or shipboard rate for a radiogram of ten words.

2. In the case of radiograms proceeding from or destined for a country and exchanged directly with the coastal stations of such country, the rate applicable to the transmission over the telegraph lines shall not, on the average, exceed the inland rate of such country.

Such rate shall be computed per word, pure and simple, with an optional minimum rate which shall not exceed the rate for ten words. It shall be stated in francs by the management of the radio service of the country to which the coastal station is subject.

In the case of countries of the European system, with the exception of Russia and Turkey, there shall be but one rate for the territory of each country.

ARTICLE XVII.

1. When a radiogram proceeding from a ship and intended for the coast passes through one or two shipboard stations the charges shall comprise, in addition to the rates of the shipboard station of origin, the coastal station and the telegraph lines, the shipboard rate of each of the ships which have participated in the transmission.

2. The sender of a radiogram proceeding from the coast and intended for a ship may require that his message be transmitted by way of one or two stations on shipboard; he shall deposit for this purpose an amount equal to the radio and telegraph rates and, in addition, a sum to be fixed by the office of origin, as surety for the payment to the intermediary shipboard stations of the transit rates fixed by paragraph 1. He shall further pay, at his option, either

the rate for a telegram of five words or the price of the postage on a letter to be sent by the coastal station to the office of origin giving the necessary information for the liquidation of the amounts deposited.

The radiogram shall then be accepted at the sender's risk; it shall show before the address the prepaid instruction, to wit: "X retransmissions telegraph" or "X retransmissions letter" according to whether the sender desired the information necessary for the liquidation of the deposits to be furnished by telegraph or by letter.

3. The rate for radiograms proceeding from a ship intended for another ship and forwarded through one or two intermediary coastal stations shall comprise:

The shipboard rates of the two ships, the coastal rate of the coastal station or two coastal stations, as the case may be, and the telegraph rate, when necessary, applicable to the transmission between the two coastal stations.

4. The rate for radiograms exchanged between ships without the intervention of a coastal station shall comprise the shipboard rates of the vessels of origin and destination, together with the shipboard rates of the intermediary stations.

5. The coastal and shipboard rates accruing to the stations of transit shall be the same as those fixed for such stations when they are stations of origin or destination. In no case shall they be collected more than once.

6. In the case of every coastal station acting as intermediary, the rate to be collected for the service of transit shall be the highest coastal rate applicable to direct communication with the two ships concerned.

ARTICLE XVIII.

The country within whose territory a coastal station is established which serves as intermediary for the exchange of radiograms between a station on board ship and another country shall be considered, so far as the application of telegraph rates is concerned, as the country of origin or of destination of such radiograms, and not as the country of transit.

5. COLLECTION OF CHARGES.

ARTICLE XIX.

The total charge for radiograms shall be collected of the sender, with the exception of:

(1) Charges for special delivery (Art. LVIII, Par. 1. of the Telegraph Regulations); (2) Charges applicable to inadmissible combinations or alterations of words noted by the office or station of destination (Art. XIX, par. 9 of the Telegraph Regulations) such charges being collected of the addressee.

Stations on shipboard shall to that end have the necessary tariffs. They shall be at liberty, however, to obtain information from coastal stations on the subject of rates for radiograms for which they do not possess all the necessary data.

2. The counting of words by the office of origin shall be conclusive in the case of radiograms intended for ships and that of the shipboard station of origin shall be conclusive in the case of radiograms proceeding from ships, both for purposes of transmission and of the international accounts. However, when the radiogram is worded wholly or in part, either in one of the languages of the country of destination, in the case of radiograms proceeding from ships, or in one of the languages of the country to which the ship is subject, in the case of radiograms intended for ships, and contains combinations or alterations of words contrary to the usage of such language, the bureau or shipboard station of destination, as the case may be, shall have the right to recover from the addressee the amount of charge not collected. In case of refusal to pay, the radiogram may be withheld.

6. TRANSMISSION OF RADIOGRAMS.

(A) SIGNALS OF TRANSMISSION.

ARTICLE XX.

The signals to be employed are those of the Morse International Code.

ARTICLE XXI.

Ships in distress shall use the following signal: . . . — — — . . . repeated at brief intervals, followed by the necessary particulars.

As soon as a station hears the signal of distress it shall cease all correspondence and not resume it until after it has made sure that the correspondence to which the call for assistance has given rise is terminated.

Stations which hear a signal of distress shall conform to the instructions given by the ship making such signal as regards the order of the messages or their cessation.

In case the call letters of a particular station are added at the end of the series of calls for assistance the answer to the call shall be incumbent upon that station alone unless such station fails to reply. If the call for assistance does not specify any particular station, every station hearing such call shall be bound to answer it.

ARTICLE XXII.

For the purpose of giving or requesting information concerning the radio service stations shall make use of the signals contained in the list appended to the present regulations.

(B) ORDER OF TRANSMISSION.

ARTICLE XXIII.

Between two stations radiograms of the same order shall be transmitted one by one by the two stations alternately or in series of several radiograms, as the coastal station may indicate, provided the duration of the transmission of each series does not exceed fifteen minutes.

(C) METHOD OF CALLING RADIO STATIONS AND TRANSMISSION OF RADIOGRAMS.

ARTICLE XXIV.

1. As a general rule, it shall be the shipboard station that calls the coastal station whether it has radiograms to transmit or not.

2. In waters where the radio traffic is very great (British Channel, etc.), a coastal station should not, as a general rule, be called by a shipboard station unless the former is within normal range of the shipboard station and not until the distance of the vessel from the coastal station is less than 75 per cent of the normal range of the latter.

3. Before proceeding to call, the coastal station or the station on shipboard shall adjust its receiving apparatus to its maximum sensibility and make sure that no other correspondence is being carried on within its radius of action; if it finds otherwise, it shall wait for the first pause, unless it is convinced that its call will not be likely to disturb the correspondence in progress. The same applies in case the station desires to answer a call.

4. For calling, every station shall use the normal wave of the station it wishes to call.

5. If in spite of these precautions the transmission of a radiogram is impeded at any place, the call shall cease upon the first request from a coastal station open to public correspondence. The latter station shall in such case indicate the approximate length of time it will be necessary to wait.

6. The station on shipboard shall make known to every coastal station to which it has signaled its presence the moment at which it proposes to cease its operations and the probable duration of the interruption.

ARTICLE XXV.

1. The call shall comprise the signal — . — . — the call letters of the station called transmitted three times, the word "from" (de) followed by the call letters of the sending station transmitted three times.

2. The called station shall answer by making the signal — . — . — followed by the call letters of the corresponding station transmitted three times, the word "from," its own call letters, and the signal — . — .

3. Stations desiring to enter into communication with ships, without, however, knowing the names of the ships within their radius of action, may employ the signal — . — . — . — (signal of inquiry). The provisions of paragraphs 1 and 2 are likewise applicable to the transmission of a signal of inquiry and to the answer to such signal.

ARTICLE XXVI.

If a station called does not answer the call (Article XXV) transmitted three times at intervals of two minutes, the call shall not be resumed until after an interval of fifteen minutes, the station issuing the call having first made sure of the fact that no radio correspondence is in progress.

ARTICLE XXVII.

Every station which has occasion to transmit a radiogram requiring the use of high power shall first send out three times the signal of warning — — — — — with the minimum of power necessary to reach the neighboring stations. It shall not begin to transmit with high power until 30 seconds after sending the signal of warning.

ARTICLE XXVIII.

1. As soon as the coastal station has answered, the shipboard station shall furnish it with the following data in case it has messages to transmit; such data shall likewise be furnished upon request from the coastal station:

(a) The approximate distance, in nautical miles, of the vessel from the coastal station;

(b) The position of the vessel indicated in a concise form and adapted to the circumstances of the case;

(c) Her next port of call;

(d) The number of radiograms, if they are of normal length, or the number of words, if the messages are unusually long.

The speed of the ship in nautical miles shall also be given if specially requested by the coastal station.

2. The coastal station shall answer stating, as provided in paragraph 1, either the number of radiograms or the number of words to be transmitted to the ship, and also the order of transmission.

3. If the transmission can not take place immediately, the coastal station shall inform the station on shipboard of the approximate length of time that it will be necessary to wait.

4. If a shipboard station called can not receive for the moment, it shall inform the station calling of the approximate length of time that it will be necessary to wait.

5. In the exchange of messages between two stations on shipboard, it shall fall to the station called to fix the order of transmission.

ARTICLE XXIX.

When a coastal station receives calls from several shipboard stations, it shall decide the order in which such stations shall be admitted to exchange their messages.

In fixing this order the coastal station shall be guided exclusively by the necessity of permitting each station concerned to exchange the greatest possible number of radiograms.

ARTICLE XXX.

Before beginning the exchange of correspondence the coastal station shall advise the shipboard station whether the transmission is to be effected in the alternate order or by series (Article XXIII); it shall then begin the transmission or follow up the preliminaries with the signal — — — — —

ARTICLE XXXI.

The transmission of the radiogram shall be preceded by the signal — — — — — and terminated by the signal — — — — — followed by the name of the sending station and by the signal — — — — —

In the case of a series of radiograms, the name of the sending station and the signal — — — — — shall only be given at the end of the series.

ARTICLE XXXII.

When a radiogram to be transmitted contains more than 40 words the sending station shall interrupt the transmission by the signal — — — — —

each series of about 20 words and shall not resume it until after it has obtained from the receiving station a repetition of the last word duly received, followed by the said signal, or, if the reception is good, by the signal — . —

In the case of transmission by series, acknowledgment of receipt shall be made after each radiogram.

Coastal stations engaged in the transmission of long radiograms shall suspend the transmission at the end of each period of 15 minutes, and remain silent for a period of 3 minutes before resuming the transmission.

Coastal and shipboard stations working under the conditions specified in Article XXXV, par. 2, shall suspend work at the end of each period of 15 minutes and listen in with a wave length of 600 meters during a period of 3 minutes before resuming the transmission.

ARTICLE XXXIII.

1. When the signals become doubtful every possible means shall be resorted to to finish the transmission. To this end the radiogram shall be transmitted three times, at most, at the request of the receiving station. If in spite of such triple repetition the signals are still unreadable, the radiogram shall be canceled.

If no acknowledgment of receipt is received, the transmitting station shall again call up the receiving station. If no reply is made after three calls, the transmission shall not be followed up any further. In such case, the sending station shall have the privilege of obtaining the acknowledgment of receipt through the medium of another radio station, using, when necessary, the lines of the telegraph system.

2. If in the opinion of the receiving station the radiogram, although imperfectly received, is nevertheless capable of transmission, said station shall enter the words "reception doubtful" at the end of the preamble and let the radiogram follow. In such case the management of the radio service of the country to which the coastal station is subject shall claim the charges in conformity with Article XLII of the present regulations. If, however, the shipboard station subsequently transmits the radiogram to another coastal station of the same management, the latter can claim only the rates applicable to a single transmission.

(D) ACKNOWLEDGMENT OF RECEIPT AND CONCLUSION OF WORK.

ARTICLE XXXIV.

1. Receipt shall be acknowledged in the form prescribed by the International Telegraph Regulations; it shall be preceded by the call letters of the transmitting station and followed by those of the receiving station.

2. The conclusion of a correspondence between two stations shall be indicated by each of the two stations by means of the signal . . . — . — followed by its own call letters.

(E) DIRECTIONS TO BE FOLLOWED IN SENDING RADIOGRAMS.

ARTICLE XXXV.

1. In general, the shipboard stations shall transmit their radiograms to the nearest coastal station.

Nevertheless, if a shipboard station has the choice between several coastal stations at equal or nearly equal distances, it shall give the preference to the one established on the territory of the country of destination or normal transit for its radiograms.

2. A sender on board a vessel shall, however, have the right to designate the coastal station through which he desires to have his radiogram transmitted. The station on shipboard shall then wait until such coastal station shall be the nearest.

In exceptional cases transmission may be made to a more distant coastal station, provided that:

(a) The radiogram is intended for the country in which such coastal station is situated and emanates from a ship subject to that country;

(b) Both stations use for calling and transmission a wave length of 1,800 meters;

(c) Transmission with this wave length does not interfere with a transmission made by means of the same wave length by a nearer coastal station;

(d) The station on shipboard is more than 50 nautical miles distant from any coastal station given in the list. The distance of 50 miles may be reduced to 25 miles provided the maximum power at the terminals of the generator does not exceed 5 kilowatts and that the station on shipboard are established in conformity with Articles VII and VIII. This reduction in the distance shall not be admissible in the seas, bays or gulfs of which the shores belong to one country only and of which the opening to the high sea is less than 100 miles wide.

7. DELIVERY OF RADIOGRAMS AT THEIR DESTINATION.

ARTICLE XXXVI.

When for any cause whatever a radiogram proceeding from a vessel at sea and intended for the coast can not be delivered to the addressee, a notice of nondelivery shall be issued. Such notice shall be transmitted to the coastal station which received the original radiogram. The latter, after verifying the addressee, shall forward the notice to the ship, if possible, by the intervention, if need be, of another coastal station of the same country or of a neighboring country.

When a radiogram received by a shipboard station can not be delivered, the station shall notify the office of the origin by official notice. In the case of radiograms emanating from the coast, such notice shall be transmitted, whenever practicable, to the coastal station through which the radiogram has passed in transit; otherwise, to another coastal station of the same country or of a neighboring country.

ARTICLE XXXVII.

If the ship for which a radiogram is intended has not signaled her presence to the coastal station within the period designated by the sender, or, in the absence of such designation, by the morning of the 8th day following, the coastal station shall so notify the office of origin which shall in turn inform the sender.

The latter shall have the right to ask, by a paid official notice, sent by either telegraph or mail and addressed to the coastal station, that his radiogram be held for a further period of 9 days for transmission to the vessel, and so on. In the absence of such request the radiogram shall be put aside as not transmissible at the end of the 9th day (exclusive of the day of posting).

Nevertheless, if the coastal station is certain that the vessel has left its radius of action before it has been able to transmit the radiogram to her, such station shall immediately so notify the office of origin, which shall, without delay, inform the sender of the cancellation of the message. The sender may, however, by a paid official notice, request the coastal station to transmit the radiogram the next time the vessel shall pass.

8. SPECIAL RADIOGRAMS.

ARTICLE XXXVIII.

The following radiograms only shall be accepted for transmission:

(1) Radiograms which answer prepaid. Such radiograms shall show before the address the indication "Answer prepaid" or "R P" supplemented by a statement of the amount paid in advance for the answer, thus: "Response payee fr. x," or "R P fr. x."

The reply voucher issued by a station on shipboard shall carry with it the right to send, within the limits of its value, a radiogram to any destination whatever from the station on shipboard which has issued such voucher.

(2) Radiograms calling for repetition of message (for purposes of verification).

(3) Special-delivery radiograms. Only, however, in cases where the amount of the charges for special delivery collected of the addressee. Countries which can not accept such radiograms shall make a declaration to this effect to the international bureau. Special-delivery radiograms with charges collected of the sender may be accepted when they are intended for the country within whose territory the corresponding station is located.

(4) Radiograms to be delivered by mail.

(5) Multiple radiograms.

(6) Radiograms calling for acknowledgment of receipt. But only as regards notification of the date and hour at which the coastal station shall have transmitted to the station on shipboard the radiogram addressed to the latter.

(7) Paid service notices. Except those requesting a repetition or information. Nevertheless, all paid service notices shall be accepted in transmission over the telegraph lines.

(8) Urgent radiograms. But only in transmission over the telegraph lines and subject to the application of the international telegraph regulations.

ARTICLE XXXIX.

Radiograms may be transmitted by a coastal station to a ship, or by a ship to another ship, with a view to being forwarded by mail from a port of call of the ship receiving the radiogram.

Such radiogram shall not be entitled to any radio retransmission.

The address of such radiogram shall embrace the following:

(1) The paid designation "mail" followed by the name of the port at which the radiogram is to be mailed;

(2) The name and complete address of the addressee;

(3) The name of the station on shipboard by which the radiogram is to be mailed;

(4) When necessary, the name of the coastal station.

Example: Mail Buenosaires 14 Calle Prat Valparaiso Avon Lizard.

The rate shall comprise, in addition to the radio and telegraph rates, a sum of 25 centimes (.048 cents) for the postage on the radiogram.

9. FILES.

ARTICLE XL.

The originals of radiograms, together with the documents relating thereto retained by the managements of the radio service, shall be kept, with all the necessary precautions as regards secrecy, for a period of at least fifteen months beginning with the month following that of the posting of the radiogram.

Such originals and documents shall, as far as practicable, be sent at least once a month by the shipboard stations to the management of the radio service to which they are subject.

10. REBATES AND REIMBURSEMENTS.

ARTICLE XLI.

1. With regard to rebates and reimbursements, the International Telegraph Regulations shall be applicable, taking into account the restrictions specified in Article XXXVIII and XXXIX of the present regulations and subject to the following reservations:

The time employed in the transmission of radiograms and the time that radiograms remain in a coastal station in the case of radiograms intended for ships, or in the station on shipboard in the case of radiograms proceeding from ships, shall not be counted as delays as regards rebates or reimbursements.

If the coastal station notifies the office of origin that a radiogram can not be transmitted to the ship addressed, the management of the radio service of the country of origin shall immediately instigate reimbursement to the sender of the coastal and shipboard rates relating to the radiogram. In such case, the refunded charges shall not enter into the accounts provided for by Article XLII, but the radiogram shall be mentioned therein as a memorandum.

Reimbursements shall be borne by the different managements of the radio service and private enterprises which have taken part in the transmission of the radiogram, each management or private enterprise relinquishing its share of the rate. Radiograms to which Articles 7 and 8 of the Convention of St. Petersburg are applicable shall remain subject, however, to the provisions of the International Telegraph Regulations, except when the acceptance of such radiograms is the result of an error made by the telegraph service.

2. When the acknowledgment of receipt of a radiogram has not reached the station which has transmitted the message, the charges shall be refunded only if the fact has been established that the radiogram is entitled to reimbursement.

11. ACCOUNTS AND PAYMENT OF CHARGES.

ARTICLE XLII.

1. The coastal and shipboard charges shall not enter into the accounts provided for by the International Telegraph Regulations.

The accounts regarding such charges shall be liquidated by the managements of the radio service of the countries concerned. They shall be drawn up by the radio managements to which the coastal stations are subject, and communicated by them to the radio managements concerned. In cases where the working of the coastal stations is independent of the management of the radio service of the country, the party working such stations may be substituted, as regards the accounts, for the radio management of such country.

2. For transmission over the telegraph lines radiograms shall be treated, so far as the payment of rates is concerned, in conformity with the International Telegraph Regulations.

3. For radiograms proceeding from ships, the radio management to which the coastal station is subject shall charge the radio management to which the shipboard station of origin is subject with the coastal and ordinary telegraph rates, the total charges collected for answers prepaid, the coastal and telegraph rates collected for repetition of message (for purposes of verification), charges relating to special delivery (in the case provided for in Article XXXVIII), or delivery by mail, and those collected for additional copies (TM). The radio management to which the coastal station is subject shall credit, when the case arises, through the channel of the telegraph accounts and through the medium of the offices which have participated in the transmission of the radiograms, the radio management to which the office of destination is subject with the total charges relating to answers prepaid. With respect to the telegraph rates and the charges relating to special delivery or delivery by mail, and to additional copies, the procedure shall be as prescribed in the Telegraph Regulations, the coastal station being considered as the telegraph office of origin.

For radiograms intended for a country lying beyond the country to which the coastal station belongs, the telegraph charges to be liquidated in conformity with the above provisions shall be those which result either from tables "A" and "B" annexed to the International Telegraph Regulations, or from special arrangements concluded between the radio managements of adjacent countries and published by such managements, and not the charges which might be collected in accordance with the special provisions of Articles XXIII, par. 1. and XXVII, par. 1, of the Telegraph Regulations.

For radiograms and paid service notices intended for ships, the radio management to which the office of origin is subject shall be charged directly by that to which the coastal station is subject with the coastal and shipboard rates. However, the total charges relating to answers prepaid shall be credited, if there is occasion, from country to country, through the channel of the telegraph accounts, until they reach the radio management to which the coastal station is subject. As regards the telegraph charges and the charges relating to delivery by mail and additional copies, the procedure shall be as prescribed in the Telegraph Regulations. The radio management to which the coastal station is subject shall credit that to which the ship of destination is subject with the shipboard rate, if there is occasion, with the rates accruing to the intermediary shipboard stations, the total charge collected for answers prepaid, the shipboard rates for repetition of message (for purposes of verification), and the charges collected for the preparation of additional copies and for delivery by mail.

Paid service notices and answers prepaid shall be treated in the radio accounts in all respects the same as other radiograms.

For radiograms transmitted by means of one or two intermediary stations on shipboard, each one of such stations shall charge the shipboard station of origin, in the case of a radiogram proceeding from a ship, or that of destination, in the case of a radiogram intended for a ship, with the shipboard rate accruing to it for transit.

4. In general, the liquidation of accounts relating to correspondence between stations on shipboard shall be effected directly between the companies working such stations, the station of origin being charged by the station of destination.

5. The monthly accounts serving as a basis for the special accounts of radiograms shall be made out for each radiogram separately with all the necessary data within a period of six months from the month to which they refer.

6. The governments reserve the right to enter into special agreements among themselves and with private companies (parties operating radio stations, shipping companies, etc.) with a view of adopting other provisions with regard to accounts.

12. INTERNATIONAL BUREAU.

ARTICLE XLIII.

In additional expenses resulting from the work of the international bureau so far as radio telegraphy is concerned shall not exceed 80,000 francs a year, exclusive of the special expenses arising from the convening of the international conference.

The managements of the radio service of the contracting States shall, so far as contribution to the expenses is concerned, be divided into six classes, as follows:

1st class: Union of South Africa; Germany; United States of America; Alaska; Hawaii and the other American possessions in Polynesia; Philippine Islands; Porto Rico and the American possessions in the Antilles; Panama Canal Zone; Argentine Republic; Australia; Austria; Brazil; Canada; France; Great Britain; Hungary; British India; Italy; Japan; New Zealand; Russia; Turkey.

2nd class: Spain.

3rd class: Russian Central Asia (littoral of the Caspian Sea); Belgium; Chile; Chosen, Formosa, Japanese Sakhalin, and the leased territory of Kwantung; Dutch Indies; Norway; Netherlands; Portugal; Roumania; Western Siberia (littoral of the Arctic Ocean); Eastern Siberia (littoral of the Pacific Ocean); Sweden.

4th class: German East Africa; German Southwest Africa; Kamerun; Togo Land; German protectorates in the Pacific; Denmark; Egypt; Indo-China; Mexico; Siam; Uruguay.

5th class: French West Africa; Bosnia-Herzegovina; Bulgaria; Greece; Madagascar; Tunis.

6th class: French Equatorial Africa; Portuguese West Africa; Portuguese East Africa and the Portuguese possessions in Asia; Bokhara; Belgian Congo; Colony of Curacao; Spanish Colony of the Gulf of Guinea; Eritrea; Khiva; Morocco; Monaco; Persia; San Marino; Italian Somaliland.

ARTICLE XLIV.

The management of the radio service of the different countries shall forward to the International Bureau a table in conformity with the annexed blank, containing the data enumerated in said table for stations such as referred to in Article V of the regulations. Changes occurring and additional data shall be forwarded by the radio managements to the International Bureau between the 1st and 10th day of each month. With the aid of such data the International Bureau shall draw up the list provided for in Article V. The list shall be distributed to the radio managements concerned. The list and the supplements thereto may also be sold to the public at the cost price.

The International Bureau shall see to it that the same call letters for several radio stations shall not be adopted.

13. METEOROLOGICAL RADIOGRAMS, TIME SIGNALS, AND OTHER RADIOGRAMS.

ARTICLE XLV.

1. The managements of the radio service shall take the necessary steps to supply their coastal stations with meteorological radiograms containing indications concerning the district of such stations. Such radiograms, the text of which shall not exceed 20 words, shall be transmitted to ships upon request. The rate for such meteorological radiograms shall be carried to the account of the ships to which they are addressed.

2. Meteorological observations made by certain vessels designated for this purpose by the country to which they are subject, may be transmitted once a day, as paid service notices, to the coastal stations authorized to receive the same by the managements concerned, who shall likewise designate the meteorological

logical offices to which such observations shall be addressed by the coastal stations.

3. Time signals and meteorological radiograms shall be transmitted one after the other in such a way that the total time occupied in their transmission shall not exceed ten minutes. As a general rule, all radio stations whose transmissions might interfere with the reception of such signals and radiograms, shall remain silent during their transmission in order that all stations desiring it may be able to receive the same. Exception shall be made in cases of distress calls and of state telegrams.

4. The managements of the radio service shall give to agencies of maritime information such data regarding losses and casualties at sea or other information of general interest to navigation, as the coastal stations may properly report.

14. MISCELLANEOUS PROVISIONS.

ARTICLE XLVI.

The exchange of correspondence between shipboard stations shall be carried on in such a manner as not to interfere with the service of the coastal stations, the latter, as a general rule, being accorded the right of priority for the public service.

ARTICLE XLVII.

Coastal stations and stations on shipboard shall not be bound to participate in the retransmission of radiograms except in cases where direct communication can not be established between the stations of origin and destination.

The number of such retransmissions shall, however, be limited to two.

In the case of radiograms intended for the coast, retransmission shall take place only for the purpose of reaching the nearest coastal station.

Retransmission shall in every case be subject to the condition that the intermediate station which receives the radiogram in transit is in a position to forward it.

ARTICLE XLVIII.

If the route of a radiogram is partly over telegraph lines, or through radio stations subject to a noncontracting Government, such radiograms may be transmitted provided the management of the radio service to which such lines or stations are subject have declared that, if the occasion should arise, they will comply with such provisions of the convention and of the regulations as are indispensable to the regular transmission of radiograms and that the payment of charges is insured. Such declaration shall be made to the International Bureau and communicated to the office of the Telegraph Union.

ARTICLE XLIX.

Modifications of the present regulations which may be rendered necessary in consequence of the decisions of subsequent telegraph conferences shall go into effect on the date fixed for the application of the provisions adopted by each one of such conferences.

ARTICLE L.

The provisions of the International Telegraph Regulations shall be applicable analogously to radio correspondence in so far as they are not contrary to the provisions of the present regulations. The following provisions of the telegraph regulations, in particular, shall be applicable to radio correspondence: Article XXVII, paragraphs 3 to 6, relating to the collection of charges; Article XXVI and XLI, relating to the indication of the route to be followed; Article LXXV, paragraph 1, LXXVIII, paragraphs 2 to 4, and LXXIX, paragraphs 2 and 4, relating to the preparation of accounts. However: (1) The period of six months provided by paragraph 2 of Article LXXIX of the telegraph regulations for the verification of accounts shall be extended to nine months in the case of radiograms; (2) The provisions of Article XVI, paragraph 2, shall not be considered as authorizing gratuitous transmission, through radio stations, of service telegrams relating exclusively to the telegraph service, nor the free

transmission over the telegraph lines of service telegrams relating exclusively to the radio service; (3) The provisions of Article LXXIX, paragraphs 3 and 5, shall not be applicable to radio accounts. As regards the application of the provisions of the telegraph regulations, coastal stations shall be considered as offices of transit except when the radio regulations expressly stipulate that such stations shall be considered as offices of origin or of destination.

In conformity with Article XI of the Convention of London, the present regulations shall go into effect on the 1st day of July, 1913.

In witness whereof the respective plenipotentiaries have signed one copy of these regulations, which shall be deposited in the archives of the British Government, and a copy of which shall be transmitted to each of the parties.

[Supplement to Article XLIV of the regulations.]

Radio management of ———. Service particulars of radio stations.

(a) COASTAL STATIONS.

	Name.
	Nationality.
	Geographical location: E. East longitude, O. West Longitude, N. North latitude, S. South latitude. Territorial subdivisions.
	Call letters.
	Normal range in nautical miles.
	Radio system with the characteristics of the transmitting system.
	Wave lengths in meters (the normal wave length to be underscored).
	Nature of service furnished.
	Hours during which station is open (local standard time).
	Coastal rate, per word in franes, minimum rate per radiogram, in franes.
	Remarks. (When necessary hour and manner of sending time signals and meteorological radiograms.)

(b) SHIPBOARD STATIONS.

	Name.
	Nationality.
	Call letters.
	Normal range. In nautical miles.
	Radio system with the characteristics of the transmitting system.
	Wave lengths in meters.
	Nature of service furnished.
	Hours during which the station is open.
	Shipboard rates per word in francs, minimum rate per radiogram in francs (1) War vessels, (2) Merchant vessels.
	Remarks. (When necessary name and address of the party working the station.)

[Supplement to Article XXII of the regulations.]

List of abbreviations to be used in radio communications.

Abbreviation.	Question.	Answer or Notice.
C Q	—	Signal of enquiry made by a station desiring to communicate.
T R	—	Signal announcing the sending of particulars concerning a station on shipboard (Art. XXII).
(I)	—	Signal indicating that a station is about to send at high power.
PRB	Do you wish to communicate by means of the International Signal Code?	I wish to communicate by means of the International Signal Code.
QRA	What ship or coast station is that?	This is
QRB	What is your distance?	My distance is
QRC	What is your true bearing?	My true bearing is degrees.
QRD	Where are you bound for?	I am bound for
QRE	Where are you bound from?	I am bound from
QRG	What line do you belong to?	I belong to the Line.
QRH	What is your wave length in meters?	My wave length is meters.
QRI	How many words have you to send?	I have words to send.
QRJ	How do you receive me?	I am receiving well.
QRK	Are you receiving badly?	I am receiving badly. Please send 20.
QRL	for adjustment?	for adjustment.
QRM	Are you being interfered with?	I am being interfered with.
QRN	Are the atmospherics strong?	Atmospherics are very strong.
QRO	Shall I increase power?	Increase power.
QRP	Shall I decrease power?	Decrease power.
QRQ	Shall I send faster?	Send faster.
QRS	Shall I send slower?	Send slower.
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRV	Are you ready?	I am ready. All right now.
QRW	Are you busy?	I am busy (or, I am busy with). Please do not interfere.
QRX	Shall I stand by?	Stand by. I will call you when required.
QRY	When will be my turn?	Your turn will be No.
QRZ	Are my signals weak?	Your signals are weak.
QSA	Are my signals strong?	Your signals are strong.
QSB	Is my tone bad?	The tone is bad.
QSC	Is my spark bad?	The spark is bad.
QSD	Is my spacing bad?	Your spacing is bad.
QSF	What is your time?	My time is
QSG	Is transmission to be in alternate order or in series?	Transmission will be in alternate order.
QSH		Transmission will be in series of 5 messages.
QSI		Transmission will be in series of 10 messages.
QSK	What rate shall I collect for?	Collect
QSL	Is the last radiogram canceled?	The last radiogram is canceled.
QSM	Did you get my receipt?	Please acknowledge.
QSN	What is your true course?	My true course is degrees.
QSO	Are you in communication with land?	I am not in communication with land.
QSP	Are you in communication with any ship or station (or, with)?	I am in communication with (through).
QSQ	Shall I inform that you are calling him?	Inform that I am calling him.
QSR	Is calling me?	You are being called by
QST	Will you forward the radiogram?	I will forward the radiogram.
QSU	Have you received the general call?	General call to all stations.
QSV	Please call me when you have finished (or, at . . . o'clock)?	Will call when I have finished.
QSW	Is public correspondence being handled?	Public correspondence is being handled. Please do not interfere.
QSX	Shall I increase my spark frequency?	Increase your spark frequency.
QSY	Shall I decrease my spark frequency?	Decrease your spark frequency.
QSZ	Shall I send on a wave length of meters?	Let us change to the wave length of meters.

1 Public correspondence is any radio work, official or private, handled on commercial wave lengths.

When an abbreviation is followed by a mark of interrogation, it refers to the question indicated for that abbreviation.

Examples.

Station.

- | | |
|----------------------|---|
| A Q R A ? | What is the name of your station? |
| B Q R A Campania | This is the Campania. |
| A Q R G ? | To what line do you belong? |
| B Q R G Cunard Q R Z | I belong to the Cunard Line. Your signals are weak. |

Station A then increases the power of its transmitter and sends:

A	Q R K?	How are you receiving?
B	Q R K	I am receiving well.
	Q R B 80	The distance between our stations is 80 nautical miles.
	Q R C 62	My true bearing is 62 degrees, etc.

Extract from the International Telegraph Convention, signed at St. Petersburg, July 10-22, 1875.

[See article 17 of the convention, p. 20.]

ARTICLE 1. The high contracting parties concede to all persons the right to correspond by means of the international telegraphs.

ART. 2. They bind themselves to take all the necessary measures for the purpose of insuring the secrecy of the correspondence and its safe transmission.

ART. 3. They declare, nevertheless, that they accept no responsibility as regards the international telegraph service.

ART. 5. Telegrams are classed in three categories:

1. State telegrams: Those emanating from the head of the nation, the ministers, the commanders in chief of the army and naval forces, and the diplomatic or consular agents of the contracting Governments, as well as the answers to such telegrams.

2. Service telegrams: Those which emanate from the managements of the telegraph service of the contracting States and which relate either to the international telegraph service or to subjects of public interest determined jointly by such managements.

3. Private telegrams.

In the transmission, the State telegrams shall have precedence over other telegrams.

ART. 6. State telegrams and service telegrams may be issued in secret language, in any communications.

Private telegrams may be exchanged in secret language between two States which admit of this mode of correspondence.

The States which do not admit of private telegrams in secret language upon the expedition or arrival of the same, shall allow them to pass in transit, except in the case of suspension defined in article 8.

ART. 7. The high contracting parties reserve the right to stop the transmission of any private telegram which may appear dangerous to the safety of the State, or which may be contrary to the laws of the country, to public order or good morals.

ART. 8. Each Government also reserves the right to suspend the international telegraph service for an indefinite period, if deemed necessary by it, either generally, or only over certain lines and for certain classes of correspondence, of which such Government shall immediately notify all the other contracting Governments.

ART. 11. Telegrams relating to the international telegraph service of the contracting States shall be transmitted free of charge over the entire systems of such States.

ART. 12. The high contracting parties shall render accounts to one another of the charges collected by each of them.

ART. 17. The high contracting parties reserve, respectively, the right to enter among themselves into special arrangements of any kind with regard to points of the service which do not interest the States generally.

PART II.—REGULATIONS GOVERNING SHIP AND LAND RADIO STATIONS.

SHIP STATIONS.

1. On vessels coming under the ship acts, an emergency power supply, independent of the vessel's main electric power plant, must be provided which will enable radio messages to be sent for at least four hours over a distance of at least 100 miles day or night. The emergency power supply and equipment should be located and installed in such manner as to afford maximum protection against accident.

2. The radio transmitting apparatus, operated from the emergency power supply, should be capable of functioning within two minutes after unexpected notice to the operator.

3. The complete equipment must be maintained in an efficient condition at sea.
4. The complete emergency equipment should be tested before each sailing and daily at sea by the operator or an inspector and a note of its performance entered in the radio log.
5. Radio Inspectors or other duly authorized officers of the Government will occasionally call for test messages, to be sent by means of the emergency apparatus, while the vessel is at sea.
6. An "induction coil" connected to "plain aerial" is not recommended as emergency apparatus, on account of the high voltages produced which frequently damage the antenna insulation and on account of "vibrator troubles."
7. A motor generator or rotary converter operated by storage battery is probably the most satisfactory means available at present of energizing the transmitting apparatus.
8. Any auxiliary engine for wireless purposes must operate on a fuel which will fulfill the requirements of Rule XI, section 5, of the General Rules and Regulations of the Steamboat-Inspection Service, reading as follows:
 "None of the inflammable articles specified in section 4472, Revised Statutes, or oil that will not stand a fire test of 300° F. shall be used as stores on any pleasure steamer or steamer carrying passengers except that vessels not carrying passengers for hire may transport gasoline or any of the products of petroleum for use as a source of motive power for motor boats or launches of such vessels." (Sec. 4472, R. S.)
9. Every ship station shall carry a reasonable number of spares of such parts of both the main and emergency radiotelegraph equipments as are subject to undue wear, deterioration, or liability to accident.
10. One extra pair of head telephones, extra cords, and extra detectors must always be kept on hand.
11. A storage battery voltmeter, hydrometer, a supply of electrolyte, and distilled water should be a part of the regular equipment, but are not prescribed in terms by statute. The absence of these and similar inexpensive emergency articles will be brought to the attention of the master and of the company installing the apparatus by the radio inspector, in writing, and if after a reasonable interval they have not been supplied, the inspector will communicate the fact to the Commissioner of Navigation.
12. The vessel's electric power for the operation of the main equipment shall, at all times while the steamer is under way, be available for the radio operator's use. On steamers where the dynamo is not run continuously there should be an efficient means of communication between the radio room and the dynamo room, in order that the radio operator may signal for power, as the law provides that he may not leave his post of duty.
13. Efficient communication between the radio room and the bridge must be maintained. A speaking tube or telephone will comply with this requirement. A bell and messenger service will not be acceptable unless there are special conditions justifying this equipment. The speaking tube or telephone must terminate in the radio room and on the bridge, or in the chart room if readily accessible from the bridge. If the radio room is adjacent to or accessible from the bridge so that orders may be transferred direct, no means of communication will be required. Any arrangement calling for the services of a third person to transmit the message will not be satisfactory. The radio inspectors will notify the ship authorities whether the means of communication provided is satisfactory at the time of inspection.
14. On vessels of the United States it is the statutory duty of the master to see that one operator is on duty at all times. The radio service of the ship is under the supreme authority of the master.
15. Masters should require operators on duty to communicate with the officer on the bridge every half hour.
16. Operators must make entries on the radio log every 15 minutes, as evidence that a continuous watch is being maintained. The entries must, if possible, consist of the call letters of other stations communicating and a few words of the intercepted messages.
17. When vessels are in port the key to the radio room must at all times be on board in charge of the proper officer and the radio equipment shall be in such condition as to facilitate Government inspection.

CLASSIFICATION OF SHIP STATIONS AND GRADES OF OPERATORS REQUIRED.

18. First class: Vessels having a continuous service. There shall be placed in the first-class vessels which are intended to carry 25 or more passengers—(1)

If they have an average speed in service of 15 knots or more; (2) if they have average speed in service of more than 13 knots, but only subject to the twofold condition that they have on board 200 persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than 500 sea miles between any two consecutive ports.

19. Second class: Vessels having a continuous watch but a service of limited duration. Other vessels placed in the second class must, during navigation, maintain a continuous watch for at least seven hours a day, and a watch of ten minutes at the beginning of every other hour.

20. Third class: Vessels which have no fixed periods of service. All vessels which are placed neither in the first nor in the second class shall be placed in the third class.

21. Service may be defined as preparedness to transmit and receive radio messages or signals at the rate of at least 20 words per minute.

22. Watch may be defined as preparedness to receive distress signals and call letters slowly. A "watcher" or cargo-grade operator will summon a first or second class operator if necessary.

23. All American vessels required by the act of July 23, 1912, to be equipped with radio apparatus, and operators must at all hours maintain a continuous watch; that is to say, an operator or watcher must be "listening in" continuously. This requirement is outside of and above the requirement based on the classification under which the ship's station is licensed.

24. Vessels voluntarily equipped are not required to maintain this continuous watch. Vessels voluntarily equipped are, however, subject to the following requirements as to watch according to the class assigned to them in their station licenses.

25. If a license of the second class be issued to a voluntarily equipped vessel, the station must maintain a continuous watch for at least seven hours a day and a watch of ten minutes at the beginning of every hour.

26. The grade of operators required on vessels of each class are prescribed in the London Convention Service Regulations, Article X. A continuous watch may be maintained by one commercial second-grade operator and one cargo-grade operator on cargo steamers.

27. Passenger vessels coming under the act of July 23, 1912, which carry or are licensed to carry 25 or more passengers, must be placed in the first class: "(a) If they have an average speed in service of 15 knots or more; (b) if they have an average speed in service of more than 13 knots, but only subject to the twofold condition that they have on board 200 persons or more (passengers and crew), and that in the course of their voyage they go a distance of more than 500 sea miles between any two consecutive ports." The service shall be carried on by at least two commercial first-grade operators.

28. Cargo vessels coming under the act of July 23, 1912, which are required to maintain a continuous watch, must be placed in the second class if continuous service is not maintained. On cargo steamers a continuous watch may be maintained by at least one commercial second-grade operator and one cargo-grade operator.

29. Passenger vessels coming under the act of July 23, 1912, but which are not required to be entered in the first class, may be entered in the first or second class, according to whether continuous service or continuous watch is maintained. The number and grade of operators required is determined by service or watch. On passenger vessels coming under the ship act but entered in the second class at least two second-grade operators are required to maintain continuous watch.

30. Cargo vessels which come under the act of July 23, 1912, and are required to maintain a continuous watch may be placed in the first class, if continuous service is maintained. (For operators, see par. 28.)

31. All vessels voluntarily equipped with radio apparatus and which have no specified hours of service or watch must be placed in the third class.

32. Any vessel voluntarily equipped may be placed in the first class if continuous service is maintained, or in the second class if a continuous watch, or a watch of limited duration, such as specified above for vessels of the second class, is maintained.

33. In all ship stations transmissions shall be made only by operators holding commercial first or second grade licenses or higher.

34. Continuous service shall be maintained by not lower than commercial first-grade operators.

35. Vessels which are voluntarily equipped with radio apparatus for their own convenience and for the correspondence of officers and crew must employ at least one commercial second-grade operator or higher.

36. Radio telephone apparatus on vessels not coming under the act of July 23, 1912, must be operated by a person holding a cargo-grade license or higher.

37. The owners of ship stations desiring to change the classification of a ship must apply for a new license.

LAND STATIONS.

38. Coast stations are stations which transmit messages to vessels at sea or on the Great Lakes, or whose operations can interfere with the exchange of messages between ship and ship or ship and coast. The principal purpose of the regulation of radio communication, international and national, is to secure the greatest efficiency of maritime communication through this agency, especially as a means of promoting safety to life.

39. Inland stations are stations which can not transmit messages to vessels at sea or on the Great Lakes and whose operations can not affect the transmission of messages between ship and ship or ship and coast. This may be due to their geographical location or to their range, dependent on power and aerial, or conditions. In some instances actual inspection may be necessary to determine whether a station should be licensed as a coast station or an inland station. An operator or owner in doubt as to the classification of his station should communicate the facts to the radio inspector of his district when applying for a license.

40. Stations are bound to give absolute priority to calls of distress from ships, to similarly answer such calls, and to take such action with regard thereto as may be required.

41. The working of stations shall be organized as far as possible in such manner as not to disturb the service of other stations.

42. All coast stations (par. 38), excepting general and restricted amateur stations, are required to be able to transmit on the wave lengths of 300 and 600 meters for the purpose of transmitting or relaying distress messages or signals and messages relating thereto, if necessary.

43. Coast stations primarily intended for long waves and long-distance transmission may install an auxiliary antenna and auxiliary transmitter to comply with the short wave length requirements.

44. The international standard wave length is 600 meters, and the operators of all coast stations are required, during the hours the station is in operation, to "listen in" at intervals of not less than 15 minutes and for a period of not less than 2 minutes, with the receiving apparatus tuned to receive this wave length, for the purpose of determining if any distress signals or messages are being sent and to determine if the transmitting operations of the "listening station" are causing interference with other radio communication.

45. General public service may be defined as "paid business," conducted on commercial wave lengths between ship and shore or ship and ship.

46. Limited public service may be defined as "paid business" between certain designated land stations, ships or lines of ships, and must be conducted on some authorized wave length other than 300 or 600 meters.

47. All special service must be conducted on some authorized wave length other than 300 or 600 meters, not interfering with general public service.

48. Limited commercial, special amateur, and all stations which have no authorized rates, shall not transmit or accept public correspondence from other stations, except in case of emergency.

49. If a general public-service coast station also maintains a limited commercial service with other stations on land or with vessels at sea the limited commercial service must be conducted on some authorized wave length other than 300 or 600 meters, but this service can be authorized on a general public-service coast-station license without stating the specific hours, it being understood that the limited commercial service is conducted only when no general public-service business is on file.

50. If a general public-service coast station also maintains a public service between fixed points on land the service between the land stations must be conducted on some authorized wave length other than 300 or 600 meters, and a separate form, No. 761, should be submitted covering "Limited public service," giving the exact hours of such service.

CLASSIFICATION OF LAND STATIONS AND GRADES OF OPERATORS REQUIRED.

51. Both coast stations (the words "coast stations," "shore stations," and "coastal stations" are used interchangeably) and inland stations are divided for the purposes of the administration of the act into the following classes: (1) Public-service stations, (a) general, (b) limited; (2) limited commercial stations; (3) experiment stations for the development of radio communication; (4) technical and training school stations; (5) special amateur stations; (6) general amateur stations; (7) restricted amateur stations.

52. CLASS 1.—(a) *Public-service stations, general*, are those open to general business between coast and ships, and include those operated by common carriers under the act of February 4, 1887, to regulate commerce, amended June 18, 1910. They are required to maintain a constant service when open. Every coastal station open to public service shall at all times be ready to receive messages of such wave lengths as are required by the international convention in force. (Sec. 4, first regulation, act of Aug. 13, 1912.) The station rates are authorized in the license and published in the Official Berne List. Whenever such stations do not insure a constant service, transmitting and receiving day and night without interruption, the Secretary of the Navy is directed to open naval radio stations within 100 miles thereof to public business. (Sec. 4, eighteenth regulation, act of Aug. 13, 1912.) The Secretary of War is authorized by the act of May 26, 1900 (31 Stat., 206), to open Alaskan military stations to public service.

53. General public service shall be conducted only by operators holding commercial first-grade licenses or higher.

54. CLASS 1.—(b) *Public service stations, limited*, are reserved for a limited public service, determined by the object of the correspondence or other circumstances independent of the system employed. Stations of this class transmit and receive public messages to and from certain stations only, which are designated in the license. The rates are authorized in the licenses, and if not published in the official list they may be obtained from the licensee.

55. The service of limited public service coast stations shall be carried on by commercial first-grade operators or higher.

56. The service of limited public service inland stations shall be carried on by commercial second-grade operators or higher.

57. CLASS 2.—*Limited commercial stations* are not open to public service and are licensed for a specific commercial service or services defined in the license. Stations of this class must not transmit to or accept public messages from other stations. No rates are authorized.

58. If a coast station, the operators shall hold a commercial second-grade license or higher. (Par. 57.)

59. CLASS 3.—*Experiment stations*.—The Secretary of Commerce is authorized by section 4 of the act to grant special temporary licenses "to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or government radiograms, of distress signals and radiograms, or with the work of other stations." Applicants for such licenses should state any technical result they have already produced, their technical attainments, etc. The fact that an applicant desires to experiment with his equipment does not justify or require a license of this class. Most experiments can be made within the limitations of general and restricted amateur station licenses or by use of an artificial antenna to prevent radiation.

60. Experiment stations may be operated by a person holding an experiment and instruction grade license or higher.

61. CLASS 4.—*Technical and training-school stations* will be licensed, according to the degree of technical training attained and imparted and to local conditions.

62. The grade of operators required will be specified when the license is issued.

63. CLASS 5.—*Special amateur stations* may be licensed by the Secretary of Commerce to use a longer wave length and a higher power on special application. Applications for this class from amateurs with less than two years' experience in actual radio communication will not be approved. The applicant must state the experience and purpose of the applicant, the local conditions of radio communication, especially of maritime radio communication in the vicinity of the station, and a special license will be granted only if some sub-

stantial benefit to the art or to commerce apart from individual amusement seems probable. (Sec. 4, fifteenth regulation, act of Aug. 13, 1912.)

64. Special amateur coast stations must be operated by a person holding a commercial second-grade license or higher. Inland stations may be operated by persons holding amateur second-grade licenses or higher.

65. CLASS 6.—*General amateur stations* are restricted to a transmitting wave length not exceeding 200 meters and a transformer input not exceeding 1 kilowatt. (Sec. 4, fifteenth regulation, act of Aug. 13, 1912.)

66. CLASS 7.—*Restricted amateur stations* within 5 nautical miles of a naval or military station are restricted to a wave length not exceeding 200 meters and to a transformer input not exceeding one-half kilowatt. (Sec. 4, sixteenth regulation, act of Aug. 13, 1912.)

67. Amateur first or second grade operators or higher are required for general and restricted amateur stations.

68. The license does not specify the number of operators required, but provides that the station shall at all times while in operation be under the care of an operator licensed for that purpose. The grade and number of operators as required by law is determined by the service of the station.

69. *Special stations for exceptional distances* are land stations designed to carry on transoceanic radio communication as between the United States and European countries, or between the Pacific coast and Hawaii, or from the United States over similar long distances at sea to another land station, or (inland) to carry on radio communication overland over exceptional distances. These stations will all come under one of the classifications named above and the license will indicate the stations for which communication is authorized and indicate the range.

REGULATIONS COMMON TO LAND AND SHIP STATIONS.

70. Any change in the characteristics of the radio apparatus or service of the station must be authorized by the Secretary of Commerce.

71. In order to comply with section 2 of the act of June 24, 1910, as amended July 23, 1912, every land station open to general public service, and every station on board an American vessel of the first or second class engaged in the foreign trade or transoceanic service, shall have as a part of the station equipment a copy of the official Berne list and supplements thereto as issued. Information concerning the use of this list and method of procuring it is given on page 72, paragraph 196.

72. The service regulations of the London convention, Article VII, paragraphs 1 and 2b, require a reduction of power or range under certain conditions. A proper resistance, impedance coil, or reactance regulator in the primary circuit is recommended. In certain cases the reduction of voltage or decreasing of coupling may be approved upon recommendations of radio inspectors.

73. Persons or corporations holding licenses for radio stations, either land or ship, should notify the radio inspector for the district whenever the station or vessel goes out of commission for a period exceeding three months. The Commissioner of Navigation should be notified promptly of any intention to suspend or discontinue the service of any commercial station.

74. If there is no intention to resume the same service, or if the station or vessel will enter a different service from that indicated by the license, the radio inspector will submit the license to the bureau, together with a statement of the facts, so that the license may be amended.

75. When the station goes into commission the radio inspector will satisfy himself that the station corresponds to the schedule of the station as shown in the license.

76. Stations desiring to conduct tests should communicate with the radio inspector by letter or telephone, stating the probable length of time that will be required. Stations conducting such tests or temporary experiments should "listen in" to determine that no interference is being caused, and during the tests should "listen in" frequently for the interference signal "Q R M." Stations conducting tests should transmit their official call signal frequently. Attention is invited to the act of August 13, 1912, section 5:

"That every license granted under the provisions of this act for the operation or use of apparatus for radio communications shall prescribe that the operator thereof shall not willfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanor, and upon a

conviction thereof the owner or operator, or both, shall be punishable by a fine not to exceed five hundred dollars or imprisonment for not to exceed one year, or both."

77. The department holds that interference caused by tests of the character described above (par. 76) is "willful" when no "listening in" precautions are taken and the call signal of the station sending is not repeated at intervals.

APPLICATIONS FOR SHIP AND LAND STATION LICENSES, RENEWALS, AND DUPLICATES.

78. The act does not apply either afloat or ashore to—(a) Apparatus for radio communication which merely receives radiograms and is not equipped for sending; (b) apparatus for the transmission of radiograms exclusively between points in the same State, if the effect of such transmission does not extend beyond the State (so as to interfere with the radio communication of other States), or if the effect of such transmission does not interfere with the reception of radiograms from beyond the State (so as to interfere with the interstate radio communication of that State); (c) apparatus for radio communication which has been issued to the Organized Militia by the War Department or to the Naval Militia by the Navy Department and is used for official purposes only.

79. The owner or operator of any apparatus who may be in doubt whether his apparatus, under this paragraph, is exempt from license may write the facts to the radio inspector for his district before applying for a license.

80. The apparatus for transmission of radiograms or signals on any vessel of the United States not permanently moored requires a license.

81. Apparatus for radio communication on land within the jurisdiction of the United States (excluding the Philippine Islands and excluding apparatus of the Government of the United States) must be licensed if—(a) the apparatus is a means of commercial intercourse among the several States or with foreign nations; or (b) the apparatus transmits radiograms or signals the effect of which at any time extends beyond the State; or (c) the apparatus interferes with the receipt of messages in any State from beyond such State.

82. Station licenses for the use and operation of apparatus for radio communication under the act may be issued only to citizens of the United States or Porto Rico, or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico.

83. Licenses can be issued to clubs if they are incorporated or if a member will accept the responsibility for the operation of the apparatus, carrying with it the possibility of being penalized for infraction of the laws.

84. Applications for station licenses of all classes should be addressed to the United States radio inspector for the district in which the station is located, who will forward the necessary blank forms and information. The limits of the districts and addresses of radio inspectors are given on page 450, paragraph 166.

85. Upon receipt of the forms, properly completed, the radio inspector will make a thorough inspection of the station if practicable.

86. When applications and forms have been properly submitted, the stations may be operated in accordance with the laws and regulations governing the class of station for which application for license has been made, until such time as the application can be acted upon unless the applicant is otherwise instructed and provided temporary official call letters are assigned.

87. General and restricted amateur-station licenses are issued directly by radio inspectors. Station licenses of all other classes are issued from the office of the Commissioner of Navigation, Department of Commerce. Applications and forms are forwarded by radio inspectors with recommendations by them.

88. Stations desiring to operate different portions of the day under different classifications shall submit application for each service, giving exact hours for each. If approved, each classification will be specified in the license.

89. The owner of an amateur station may operate his station in accordance with the laws if his application for a license has been properly filed but has not been acted upon. An application for an operator's license must also have been filed and every effort made to obtain the license before the station may be operated.

90. "Provisional" station licenses are issued to amateurs remote from the headquarters of the radio inspector of the district in which the station is located. These licenses are issued as a matter of convenience and record. If, upon inspection, the station is found to comply with the law, the inspector will

strike out the word "Provisional" and insert the date of inspection and his signature at the bottom of the license.

91. If such a station is found not to comply with the law the provisional license may be canceled until such time as the apparatus is readjusted to meet the requirements of the law: *Provided, however*, That consideration will be given to any reports of interference filed against such a station.

92. All persons are warned that it is unlawful to operate stations after licenses have expired unless application for renewal has been properly made.

93. Hereafter expired station licenses of all classes, commercial and amateur, need not be returned to the radio inspectors with applications for renewals. Owners desiring a renewal license must complete new forms, as prescribed for original applications. New licenses will be issued in every case of renewal.

94. Any person applying for a duplicate license to replace an original which has been lost, mutilated, or destroyed will be required to submit an affidavit to the Bureau of Navigation, through the radio inspector of the district, attesting the facts regarding the manner in which the original was lost. The Commissioner of Navigation will consider the facts in the case and advise the radio inspector in regard to the issue of a duplicate license, or a duplicate will be forwarded through the inspector's office.

95. A duplicate license will be issued under the same serial number as the original and will be marked "Duplicate" in red across the face.

PART III.—REGULATIONS GOVERNING RADIO OPERATORS.

GRADES AND REQUIREMENTS.

96. (1) Commercial extra first grade; (2) commercial first grade; (3) commercial second grade; (4) commercial cargo grade; (5) commercial temporary permit; (6) experiment and instruction grade; (7) amateur first grade; (8) amateur second grade.

97. The Service Regulations of the International Convention require that "the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject."

98. Such certificate shall attest the professional efficiency of the operator as regards—(a) Adjustment of the apparatus and knowledge of its functioning; (b) transmission and acoustic reception at the rate of not less than 20 words a minute (Continental Morse) for commercial first-grade operators and not less than 12 words per minute for second-grade operators; (c) knowledge of the regulations governing the exchange of wireless telegraph correspondence; (d) the certificate shall furthermore state that the Government has bound the operator to secrecy with regard to the correspondence.

99. The International Convention has been ratified by the principal maritime nations, dominions, and provinces. Radio operators holding valid certificates issued by foreign Governments which are parties to the convention will be recognized by this department as persons "skilled in the use of such apparatus" within the meaning of the act, unless in the case of a specific individual there may be special reason to doubt the operator's skill and reliability. Such certificates should be ready at hand for the inspection of radio inspectors or customs officers before the steamer departs from the United States.

100. In the case of a vessel subject to the act under the flag of any nation not a party to the International Convention, the radio operator, before the departure of the vessel from the United States, must furnish to the inspector evidence that he is "skilled in the use of the apparatus." This evidence shall consist of an examination on board by the radio inspector.

101. *Commercial extra first grade.*—The Department of Commerce will issue a special license, to be known as commercial extra first grade, to radio operators whose trustworthiness and efficient service entitle them to confidence and recognition.

102. These licenses will be given consideration by the Civil Service Commission in examinations for positions requiring knowledge of radiotelegraphy, when experience is rated as a part of such examinations.

103. Applicants for the commercial extra first-grade license must pass a special examination. To be eligible for this examination they must hold commercial first-grade licenses, and their certificates of skill in radio communication, issued under the act of June 24, 1910, or licenses under the act of August 13, 1912, must record 18 months' satisfactory commercial service at

sea or at land stations, either or both, during the two years previous to the filing of the application for examination, as shown by indorsement on the license service records, or other satisfactory evidence, and provided that the applicants have not been penalized for a violation of the radio laws and regulations.

104. A speed of at least 30 words per minute, Continental Morse, and 25 words per minute, American Morse (five letters to the word); must be attained. The technical questions and the questions on the radio laws and regulations will be considerably wider in scope than those for commercial first grade, and a higher percentage will be required.

105. All examination papers, including the code-test sheets, will be marked and forwarded to the Commissioner of Navigation, with a recommendation by the radio inspector or examining officer. Examination papers will be marked upon the basis of 100, and licenses will be recommended only if 80 or better is attained.

106. Licenses of this grade will be issued by the Commissioner of Navigation, indorsed by the Secretary of Commerce, and delivered to the successful applicant through the examining officer.

107. *Commercial first grade.*—The applicant must pass a satisfactory examination in—(a) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave length to another; (b) transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse (five letters to the word); (c) use and care of storage battery or other auxiliary power apparatus; (d) knowledge of the international regulations in force applying to radio communication; (e) knowledge of the requirements of the acts of Congress to regulate radio communication (secs. 3, 4, 5, 6, and 7 of the act of Aug. 13, 1912).

108. The commercial extra first grade and the commercial first grade licenses qualify holders for employment at any ship or land station of any class.

109. *Commercial second grade.*—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall not be less than 12 words a minute in Continental Morse, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

110. *Commercial cargo grade.*—Section 2 of the act of July 23, 1912, provides: "On cargo steamers, in lieu of the second operator provided for in this act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life."

111. The examination will be conducted so as to determine the following facts: (a) That the applicant is sufficiently familiar with the Continental Morse Code to recognize the distress signal (SOS), when included in a list of other words or signals sent slowly (approximately five words a minute); (b) that the applicant is sufficiently familiar with the Continental Morse Code to recognize radio call letters of the vessel on which he desires to operate when sent slowly and repeated several times; (c) that the applicant is sufficiently familiar with the type of the receiving apparatus of the vessel on which he desires to operate to determine by a buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

112. Examining officers and radio inspectors are authorized to issue a certificate, in the form of an amateur first-grade license, after examination, to indicate the facts above enumerated in the case of a member of the crew or other person, and experience under this form will be credited by examining officers if the holder later applies for examination for a commercial license. These licenses will be marked "Cargo" in the upper right-hand corner under the serial number.

113. *Commercial temporary permit.*—Section 3 of the act of August 13, 1912, provides: "In case of emergency the Secretary of Commerce may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship act of June 24, 1910."

114. The temporary permit, in the form of a letter to the operator, is to be issued only in cases of emergency and will be valid for one voyage from _____ to _____, beginning _____, unless the proper license or properly licensed operator can be obtained en route.

115. The permits should be issued only to persons who the collector of customs has reason to believe are skilled in the use of the apparatus, but have not had the opportunity to present themselves for examination before Government officers authorized to conduct examinations and furnish licenses.

116. The collector of customs will forward to the Department of Commerce (Bureau of Navigation) a report covering each temporary permit issued and the reasons for its issue.

117. *Experiment and instruction grade.*—Experimenters and instructors of scientific attainments in the art of radio communication whose knowledge of the radio laws satisfies the radio inspector or the examining officer may obtain this grade license, provided they are able to transmit and receive in the continental Morse code at a speed sufficient to enable them to recognize distress calls or the "keep-out" signals.

118. The operator's license for this grade is a commercial license, indorsed by the Secretary of Commerce with a statement of the special purpose for which it is valid.

119. If the applicant qualifies, the radio inspector or examining officer will forward a blank commercial license, with the papers, to the Commissioner of Navigation, with his recommendation. If approved, the license will be properly indorsed by the Secretary of Commerce and delivered to the licensee through the recommending officer.

120. This license has no reference to the instruction of radio operators as such, but is required by those operating apparatus licensed as experimental stations but who are unable to obtain commercial grade operators' licenses.

121. Amateurs before applying for licenses should read and understand the essential parts of the International Radiotelegraphic Convention in force and sections 3, 4, 5, and 7 of the act of August 13, 1912. The department recognizes that radio communication offers a wholesome form of instructive recreation for amateurs. At the same time its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The department will not knowingly issue a license to an amateur who does not recognize and will not obey this principle. To this end the intelligent reading of the international convention and the act of Congress is prescribed as the first step to be taken by amateurs. A copy of the radio laws and regulations may be procured for this purpose from the radio inspectors or from the Commissioner of Navigation, Department of Commerce, Washington, D. C., but they are not for public distribution. Additional copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a nominal price.

122. *Amateur first grade.*—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus which he wishes to operate and of the regulations of the international convention and acts of Congress in so far as they relate to interference with other radio communication and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in continental Morse at a speed sufficient to enable him to recognize distress calls or the official "keep-out" signals. A speed of at least five words per minute (five letters to the word) must be attained.

123. *Amateur second grade.*—The requirements for the second grade will be the same as for the first grade. The second-grade license will be issued only where an applicant can not be personally examined or until he can be examined. An examining officer or radio inspector is authorized in his discretion to waive an actual examination of an applicant for an amateur license, if the amateur for adequate reasons can not present himself for examination but in writing can satisfy the examining officer or radio inspector that he is qualified to hold a license and will conform to its obligations.

EXAMINATIONS.

124. The following requirements and method of conducting examination for radio operators' licenses will be adopted at all examining offices.

125. The test shall consist of messages with call letters and regular preambles, conventional signals and abbreviations and odd phrases, and shall in no case consist of simple, connected reading matter. The test will be conducted by means of the omnigraph or other automatic instrument wherever possible.

126. The code test shall continue for 5 minutes at a speed of 20 words, 12 words, and 5 words a minute, respectively, for the commercial first, second, and lower grades, 5 letters, numerals, or other characters to the word, and to

qualify the applicant must receive 20, 12, or 5 words in consecutive order accurately and legibly written. Operators will not be permitted to break or interrupt while receiving or to correct or alter the transcription after it has been submitted to the examining officer.

127. The code test sheets written by the applicant will be forwarded to the Commissioner of Navigation with other papers and the speed attained noted in the lower left-hand corner of the first sheet.

128. An applicant will be given credit for the maximum speed he can attain.

129. The practical and theoretical examination shall consist of seven comprehensive questions under the following headings and values:

	Points, maxi- mum value.
(a) Experience.....	20
(b) Diagram of receiving and transmitting apparatus.....	10
(c) Knowledge of transmitting apparatus.....	20
(d) Knowledge of receiving apparatus.....	20
(e) Knowledge of operation and care of storage batteries.....	10
(f) Knowledge of motors and generators.....	10
(g) Knowledge of international regulations governing radio communica- tion and the United States radio laws and regulations.....	10
	100

130. Seventy-five constitutes a passing mark for the first grade commercial. Sixty-five constitutes a passing mark for the second grade commercial.

131. Applicants who fail to attain 20 words in the code test but who attain a mark of between 65 and 75 in the written examination may be issued second-grade licenses, if they can receive at least 12 words per minute.

132. Question (a) shall determine the applicant's practical knowledge and experience in handling radio apparatus. An applicant's experience will be determined largely from the personal question sheet and from satisfactory letters or references submitted. Experience, operating first-class amateur apparatus, or the apparatus provided in good training schools, will be given a reasonable value, but applicants who have had experience as apprentices at commercial shore stations or on board vessels will receive higher marks.

133. No applicant who fails to qualify will be reexamined at any examining office within three months from date of the previous examination. All examination papers, whether the applicant qualifies or not, will be forwarded to the Bureau of Navigation for filing as "Operator's record." When the records of the bureau develop the fact that an applicant has failed to qualify and has applied for reexamination or been reexamined at the same or another office within three months his existing license may be suspended or revoked by the Secretary of Commerce. Applicants to whom are issued second-grade licenses will not be examined for first grade within three months under the same rule.

PLACES WHERE EXAMINATIONS ARE HELD.

134. United States navy yards: Boston, Mass.; New York; Philadelphia, Pa.; Norfolk, Va.; Charleston, S. C.; New Orleans, La.; Mare Island, Cal.; Puget Sound, Wash.

135. Naval radio stations: San Juan, P. R.; Colon, R. P.; Honolulu, H. T.; Key West, Fla.

136. United States Army stations: Fort Omaha, Nebr.; Fort Wood, N. Y.; Fortress Monroe, Va.; Fort St. Michael, Alaska; Fort Valdez, Alaska.

137. Bureau of Navigation, Department of Commerce, Washington, D. C.

138. Radio inspectors, at their offices and elsewhere, by special arrangement.

139. Additional opportunities for taking the examination will be afforded as may be deemed necessary, and these special dates and places may be ascertained by communication with the Commissioner of Navigation or nearest radio inspector.

140. All licenses, when awarded, will be delivered through the officer who conducted the examination.

141. Examinations for the commercial extra first-grade licenses will be held at the following offices only by appointment.

142. Commandants, navy yards: Boston, Mass.; Brooklyn, N. Y.; Philadelphia, Pa.

143. United States radio inspectors, customhouses: New Orleans, La.; San Francisco, Cal.; Seattle, Wash.; Cleveland, Ohio; Chicago, Ill.

144. Commissioner of Navigation, Department of Commerce, Washington, D. C.

145. In special cases, upon application to the Commissioner of Navigation, arrangements may be made for examinations at other points.

APPLICATIONS FOR EXAMINATIONS FOR RADIO OPERATORS' LICENSES, RENEWALS, AND DUPLICATES.

146. An operator's license may be granted to any person without regard to sex, nationality, or age if the applicant can fulfill the requirements for the class of license desired.

147. Applicants for licenses should communicate in writing with the commandants, commanding officers, or officers in charge, at navy yards and Army posts, with the Commissioner of Navigation, or radio inspectors, in order to fix the date when they can be examined. (See pars. 134-145.)

148. Commercial licenses can only be obtained by personal examination. Where applicants are at remote points or can not proceed to examining offices, efforts will be made to examine them through radio inspectors when they are in that vicinity, but special trips can not be made for that purpose.

149. Amateurs should write to the nearest examining officer in their vicinity (see pars. 134-145) for Form 756 "Application for operator's license," and to the radio inspector in their vicinity for Form 762 "Amateur applicant's description of apparatus."

Foreign-born applicants for station licenses must submit satisfactory evidence of their citizenship.

150. Amateur operators at points remote from examining officers and radio inspectors may be issued second-grade amateur licenses without personal examination. Examinations for first-grade licenses will be given by the radio inspector when he is in that vicinity, but special trips can not be made for this purpose. (See par. 123.)

151. Persons holding radio operators' licenses, amateur second grade, should make every effort to appear at one of the examination points to take the examination for amateur first-grade license or higher.

152. Persons holding radio operators' licenses of any grade should, before their licenses expire, apply to the nearest radio inspector or examining officer for renewal and submit Form 756 in duplicate.

Holders of commercial extra first-grade radio operators' licenses may be issued renewal of such licenses without examination, provided the service records on the backs of the licenses properly certify to 12 months' satisfactory service in a land or ship station open to general public service, at least 6 months of which must have been served during the last 12 months of the license period.

However, holders of commercial extra first-grade licenses now employed as radio inspectors, radio instructors, or similar occupations requiring exceptional qualifications where the duties require the testing, or demonstrating, or otherwise using commercial radio apparatus and the telegraph codes, may be issued renewals of their licenses without reexamination, provided, in addition to the above, they can show satisfactory evidence of such service covering a period of 18 months out of the two-year license period. Where the applicant has not used regularly the telegraph codes, he will be given the code examination required in the original examination or, if he has used only one code, he will be examined in the code not used.

The service record shown on the licenses must be transcribed on Form 756.

The license may be marked "Expired" in red across the face and returned to the operator, if desired. The action taken should be noted on Form 756.

Where the record on the reverse side of the license does not show the service performed, the evidence submitted as proof of such service must be transmitted to the bureau with Form 756.

Transcriptions of code tests must be submitted to the bureau.

153. (a) Renewal licenses may be issued to commercial-grade operators without examination, provided the service records on the backs of licenses properly certify to three months' satisfactory commercial service during the last six months of the license term. If expired licenses have been lost or destroyed, an affidavit must be submitted attesting the facts regarding the manner in which the license was lost. In such cases evidence of the required satisfactory commercial service may be submitted in the form of letters, signed by masters and employers.

(b) Operators holding licenses of grades other than commercial, who submit satisfactory evidence to the examining officer, showing actual operation of radio apparatus for three months during the last six months of the license term, may be issued new licenses without examination. Otherwise, applicants for renewals will be examined in the usual manner.

(c) Renewals or new licenses may be issued a reasonable length of time previous to the expiration of existing licenses, but must bear the exact date of issue, which must correspond with the date on the back of Form 756 forwarded to the commissioner of navigation.

(d) Operators who fail to apply for renewal of their licenses on or prior to the date of expiration must be reexamined. If, because of circumstances over which the applicant has no control, an operator is unable to apply for renewal of license on or prior to the date of expiration, an affidavit may be submitted to the commissioner of navigation, through the radio inspector or examining officer, attesting to the facts, which will be considered by the commissioner of navigation, who will advise the radio inspector or examining officer in regard to the issue of a renewal of the license without reexamination.

(e) Service records must be completed and signed only by masters, employers, or the duly authorized agents of either.

(f) Any improper alteration of the service record or the forgery of masters' or employers' signatures constitute a violation of the regulations, and the operator may suffer suspension of license for a period not exceeding one year, at the discretion of the Secretary of Commerce.

154. Whether or not a new license is issued, the radio inspector or examining officer will forward one copy of Form 756, properly completed, to the Commissioner of Navigation, Department of Commerce. If a new license is not issued, the reason therefor will be stated on the back of the form.

155. Any operator applying for a duplicate license to replace an original which has been lost, mutilated, or destroyed will be required to submit an affidavit to the Bureau of Navigation through the radio inspector or examining officer who issued the original, attesting the facts regarding the manner in which the original was lost. The Commissioner of Navigation will consider the facts in the case and advise the radio inspector in regard to the issue of a duplicate license. A duplicate license will be issued under the same serial number as the original and will be marked "Duplicate" in red across the face.

156. Operators' licenses are not valid until the oath for the preservation of the secrecy of messages is properly executed before a notary public or other officer duly authorized to administer oaths. Licenses must indicate on their faces that the oath has been taken and the officer administering the oath on the back of the license should sign also in the blank provided on the face. Licenses will not be signed by examining officers until the oath of secrecy has been properly executed.

157. Operators' licenses should be framed and posted in the radio room, and licenses for stations should be accessible at all times to inspectors.

158. Under the supervision of a licensed operator an apprentice or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had himself violated the regulations.

159. An individual record is kept in the Bureau of Navigation, Department of Commerce, at Washington, of each licensed operator. Each operator's examination papers and all reports in regard to interference or violations of the radio laws and regulations are filed for reference.

160. Radio operators holding licenses of any grade or class and applying for examination for any other grade or class must submit to the examining officer Form 756 in duplicate. Licenses held by them must be submitted to the examining officer.

161. Radio operators who pass the examination for a higher-grade license are required to submit their existing licenses to examining officers, to be marked "Canceled."

162. Expired or canceled licenses will be returned to the licensees, marked "Canceled" or "Expired" in red across their faces, provided the particulars on Form 756, submitted herewith, are found correct by the examining officer. The service record shown on the reverse side of the license must be transcribed on Form 756.

PART IV.—GENERAL INFORMATION.

ADMINISTRATION AND ADMINISTRATIVE DISTRICTS.

163. The department has established, for the purpose of enforcing, through radio inspectors and others, the acts relating to radio communication and the international convention, the following districts, with the principal office for each district at the customhouse of the port named.

164. Communications for radio inspectors should be addressed as follows, and not to individuals: Radio Inspector, Customhouse. _____ (city), _____ (State).

165. Communications for the Bureau of Navigation should be addressed as follows, and not to individuals: Commissioner of Navigation, Department of Commerce, Washington, D. C.

166. (1) Boston, Mass.: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

(2) New York, N. Y.: New York (county of New York, Staten Island, Long Island, and counties on the Hudson River to and including Schenectady, Albany, and Rensselaer) and New Jersey (counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).

(3) Baltimore, Md.: New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.

(4) Savannah, Ga.: North Carolina, South Carolina, Georgia, Florida, Porto Rico.

(5) New Orleans, La.: Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.

(6) San Francisco, Cal.: California, Hawaii, Nevada, Utah, Arizona.

(7) Seattle, Wash.: Oregon, Washington, Alaska, Idaho, Montana, Wyoming.

(8) Cleveland, Ohio: New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (lower peninsula).

(9) Chicago, Ill.: Indiana, Illinois, Wisconsin, Michigan (upper peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

REPORTING OF VIOLATIONS.

167. The regulations established by law, or by the authority of law, or of the international convention, will be enforced by the Secretary of Commerce through collectors of customs, radio inspectors, and other officers of the Government.

168. The service regulations of the radiotelegraphic convention in force provide that "no station on shipboard shall be established or worked by private enterprise without authority from the Government to which the vessel is subject." Such authority shall be in the nature of a license issued by said Government. Stations on foreign ships will be licensed by their governments, respectively. Inspectors will report to the Commissioner of Navigation stations on foreign ships not so licensed.

169. A radio inspector is authorized in exceptional cases to act outside of his district for the convenience of commerce. In such cases he will communicate before or after acting with the inspector in whose district he has acted. Radio inspectors are authorized to communicate directly with collectors of customs and to cooperate with them in the enforcement of the law.

170. Violations of the laws and regulations will be reported to the chief customs officer of the district in which the offense occurs, who will report the case to the Secretary of Commerce (Bureau of Navigation), according to the procedure followed in violations of the navigation laws. Misdemeanors will be reported to the United States district attorney in the usual manner.

171. Collectors of customs and radio inspectors are enjoined that the reports required by paragraph 170 must be precise statements of the facts as the basis for possible proceedings by the United States attorney.

172. Violations by the master of a vessel of the United States of the provisions of the second paragraph of section 1 of the ship act will be reported to the collector of customs directly, and the usual procedure in cases of fines and penalties will be followed.

INSPECTION OF SHIP STATIONS.

173. The radio inspectors and customs officers, as far as practicable, shall visit steamers subject to the act before they leave port and ascertain if they are equipped with the apparatus in charge of the operators prescribed by law and regulation.

174. When the radio apparatus is certified as complying with the requirements of law by the competent authorities of a foreign Government, such certificate will be recognized by this department, but the radio inspector or customs officer may, if he deem it necessary or desirable, satisfy himself that the apparatus is in good working order.

175. Whenever practicable the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the act of June 24, 1910, as amended July 23, 1912, that the radio apparatus is efficient and in good working order within the meaning of the act. If the apparatus does not comply with the law, the radio inspector will furnish the master with the stub of Form 771 "inspection record" on which will be noted the particulars in which the apparatus does not comply with the law. Where apparatus is found to be in compliance with the law, the stub of Form 771 will not be detached.

176. Masters of vessels entering a port of the United States and expecting to leave under the act of June 24, 1910, as amended July 23, 1912, should file Form 753a "Radio declaration" (Appendix A) in duplicate with the customs officer at the time of entry. The customs officer will furnish one copy to the radio inspector in order that proper inspection of the radio equipment may be made before departure.

177. For each departure of a steamer under the act of June 24, 1910, as amended July 23, 1912, the master is required to furnish to the customs officer a certificate in the form of Appendix B (Form 753b) "Master's certificate of radio apparatus." Such certificates shall be retained in the files of the collectors of customs. The collector of customs will arrange for the collection of these certificates at all times.

178. Where a steamer subject to the radio law is without the apparatus and the operators prescribed, or either of them, and is about to attempt to leave port, the radio inspector or customs officer visiting the vessel shall—(a) furnish the master with a memorandum (stub of Form 771) of the particulars in respect of which the law has not been complied with and the penalty; (b) if convenient, notify the vessel's agents or the proper person in charge of the apparatus so that the necessary corrections may be made before sailing.

179. If a steamer clears in violation of the law, the radio inspector or customs officer shall submit to the collector of customs of the port a written report, stating the exact nature of the violation, the section of the law violated, and the penalties involved and all of the circumstances in connection therewith which will be of service to the collector and to the Secretary of Commerce in determining what action shall be taken. A copy of the report will be forwarded to the Commissioner of Navigation.

180. Statements should be obtained from operators, ship's officers, or other witnesses at the time the violation is discovered and should accompany the report to the collector of customs.

181. The collector of customs will report the case to the Secretary of Commerce in the usual manner as a navigation fine case.

182. Merchant vessels chartered by the United States Government are subject to the act of August 13, 1912, in every case, if the radio apparatus is owned and operated by a commercial company.

183. Merchant vessels chartered by the United States Government for the transportation of persons or supplies are subject to the requirements of the ship act (act of July 23, 1912), if the vessel is controlled and operated by the owners. Vessels commanded wholly or in part by Government officers are not subject to the ship act.

184. Government vessels or vessels chartered by the Government are subject to the act of August 13, 1912, if the radio equipment is owned and operated by private interests.

185. The ship act does not authorize the refusal of clearance in case of violation of its provisions, but specifically provides for the imposition of a fine in a sum not more than \$5,000.

186. The act does not apply to a vessel at the time of entering a port of the United States. Radio inspectors and customs officers may, however, accept as

evidence of the efficiency of the apparatus and the skill of an operator messages shown to have been transmitted and received by him over a distance of at least 100 miles, by day, during the voyage to the United States.

OPERATORS ON FOREIGN VESSELS.

187. In so far as licensed operators are concerned a sharp distinction should be drawn between the act of July 23, 1912, which requires apparatus and operators for radio communication on steamers, and the act of August 13, 1912, to regulate radio communication.

188. The act of July 23, 1912, amending the act of June 24, 1910, is designed to promote safety at sea through the employment of apparatus and operators to transmit and receive distress calls and other calls relating to perils and aids to navigation. It provides that in the case of American and foreign vessels subject to its provisions "the radio equipment must be in charge of two or more persons skilled in the use of such apparatus." This act does not require that the operators shall be licensed, and the penalty prescribed in section 3 of the act is not incurred by the master of a vessel whose operators are "skilled in the use of such apparatus," even though they may not be licensed.

189. The act of August 13, 1912, is designed to execute in behalf of the United States the International Radiotelegraphic Convention and thus to promote orderly exchanges by radio communication. For this purpose the International Radiotelegraphic Convention (Service Regulations) provides that the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

190. Section 3 of the act of August 13, 1912, carries out this provision of the International Convention by providing licenses for operators on American vessels. If an unlicensed person serves in charge or in supervision of the use and operation of the apparatus both he and his employer are liable to a fine of not more than \$100 or imprisonment for not more than two months or both. This section and penalty do not apply to operators on foreign ships. But operators on the ships of foreign nations signatory to the International Radiotelegraphic Convention, as shown above, are required to have certificates or licenses from their own governments, and if not so certificated, the obligations of the convention have not been observed. The convention in the Service Regulations provides for this situation.

191. The act of July 23, 1912, as stated, requires that on American and foreign ships the operators must be "skilled in the use of such apparatus," but does not require that they must be licensed. To facilitate commerce and simplify administration, operators presenting American licenses or foreign certificates are accepted as "skilled in the use of such apparatus," except where there may be special reasons to doubt the operator's skill or reliability. Where operators on American or foreign ships do not have such licenses or foreign certificates, radio inspectors or customs officers under the act of July 23, 1912, may accept other competent evidence of skill or may examine such operators.

OFFICIAL INTERNATIONAL LIST OF COAST AND SHIP RADIO STATIONS OF THE WORLD AND STATION RATES.

192. The list of land and ship stations of the United States, including amateurs, giving call letters, wave lengths, nature of service, etc., can be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a nominal price.

193. Supplements to this list are issued monthly under the title "Radio Service Bulletin," and the list is revised annually as of July 1. These monthly supplements contain information concerning Government, commercial, and special stations only, and information regarding amateur stations appears only in the annual edition of the list of Radio Stations of the United States. Amendments to or changes in the Radio Laws and Regulations of the United States are printed in this bulletin in such a manner that they may be clipped and pasted in their proper places in that publication. Items of general interest concerning the enforcement of the radio laws are printed in the bulletin from time to time, as occasion warrants.

194. The introduction to the list of "Radio Stations of the United States" contains information concerning the assignment of international and amateur call letters.

195. A copy of the official Berne list and supplements as issued are required as a part of the equipment of every land station open to general public service and every ship station of the first or second class on American vessels engaged in foreign trade or the transoceanic service.

196. The International List of Radio Stations of the World (edition in English) can be procured from the International Bureau of the Telegraphic Union (Radiotelegraphic Service), Berne, Switzerland.

197. In addition to the information contained in the pamphlet of the United States stations, published by the Bureau of Navigation, the international list shows geographical locations, normal ranges in nautical miles, radio systems, and rates.

198. The international list includes the Government and commercial land and ship stations of the United States. The list is divided into three parts. The first part contains a list of ship stations, grouped by countries and arranged alphabetically; the second part contains a list of land stations arranged in the same manner; and the third part contains tables of land line and cable charges from coast radio stations to inland and various other points. In computing the total word rate applicable to a radiogram from a ship station to an inland point or vice versa, the three rates must be added. The rates in the international list are stated in francs. For approximate purposes 1 franc equals 20 cents and 5 centimes equals 1 cent. Supplements to the international list will be issued monthly, and will contain new stations and tables of alterations.

199. The International Alphabetical List of Call Letters (stations of the world) is also issued by the international bureau at Berne, and supplements will be issued monthly.

200. Neither the international list proper nor the supplements will contain a list of amateur stations.

201. Inquiries as to the subscription price of these lists should be made direct to the Berne bureau, at the address given above. (See par 196.) Remittances to Berne should be made by international postal money order.

MISCELLANEOUS INFORMATION.

202. Stations equipped to receive only do not require licenses.

203. Operators of receiving stations do not require licenses, but all persons are required to maintain secrecy in regard to messages, as provided in the act of August 13, 1912, nineteenth regulation of section 4.

204. Distances under the radio laws are computed in nautical miles.

205. No fees are charged for any operator or station license.

206. Licensed stations must be operated by or under the direct supervision of properly licensed operators.

207. Amateur stations within 5 miles of naval or military stations need not have been in actual operation on or before August 13, 1912, to obtain a license for a restricted amateur station.

208. The master of a vessel shall have the right to censor all messages addressed to or transmitted by a radio telegraph station on board his vessel, but such master shall not divulge to any person (other than the properly authorized officials of the Government, or a competent legal tribunal) or make any use whatever of any message coming to his knowledge through the exercise of such censorship, nor shall the master or any operator divulge to any person (other than the properly authorized officials of the Government, or a competent legal tribunal) or make any use whatever of any message (other than a message of distress) coming to his knowledge and not intended for the said station.

209. The transmission of superfluous signals by any ship or coast station is absolutely prohibited; trials and practices are forbidden except under such circumstances as to preclude the possibility of interference with other stations.

210. No person shall transmit or make a signal containing profane or obscene words or language.

211. Additional or amendatory regulations will be issued from time to time as they may appear necessary.

APPENDIX TO RADIO COMMUNICATION LAWS.

[Appendix A.—Radio Service Form 752.]

CERTIFICATE OF RADIO INSPECTION.

PORT OF _____,
_____, 191____.

This is to certify that I have to-day examined the apparatus for radio communication on the S. S. _____, of which _____ is master, about to leave this port for _____, and I have found the same efficient and in good working order, as prescribed by the act of June 24, 1910, as amended by the act of July 23, 1912.

(Signed) _____,
Radio Inspector.
(Or) _____,
Customs Inspector.

[Appendix B.—Radio Service Form 753.]

MASTER'S CERTIFICATE OF RADIO APPARATUS.

NOTICE.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every willful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars. (Act of July 23, 1912.)

PORT OF _____,
_____, 191____.

This is to certify that I have to-day examined the apparatus for radio communication on the S. S. _____, of which I am master, about to leave this port for _____, and I have found the same efficient and in good working order, as prescribed by the act of June 24, 1910, as amended by the act of July 23, 1912.

(Signed) _____, *Master.*

No. _____

LICENSE FOR GENERAL PUBLIC SERVICE COAST RADIO STATION.

[Department of Commerce. Bureau of Navigation. Radio Service.]

Pursuant to the act to regulate radio communications, approved August 13, 1912, _____, a citizen of the State of _____

_____ a company incorporated under the laws of the State of _____, having applied therefor, is hereby granted by the Secretary of Commerce for a period of _____ on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the schedule hereinafter) located in the State of _____, city or town of _____, for the purpose of transmitting to and receiving from ship stations and other land stations general public correspondence, Government and service correspondence, and distress signals and messages, at rates of compensation not in excess of those fixed by the international agreement to which the Government of the United States has adhered, which have been submitted to and approved by the Secretary of Commerce, as included in the schedule hereinafter.

2. The use or operation of apparatus for radio communication pursuant to this License shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President "to the end that the same and every article and clause thereof may be observed and fulfilled with good

faith by the United States and the citizens thereof," and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The authority conferred by this License is subject to the provisions of the act of February 4, 1887, entitled "An Act to regulate commerce," as amended by the act of June 18, 1910, so far as the Licensee may be within the operation of said act, and except as provided in the act of August 13, 1912, or in the International Radiotelegraphic Convention and regulations made part thereof, the station shall transmit all messages offered by those who tender lawful rates on equal terms without discrimination, whether as regards rates, order of transmission, or otherwise.

4. The licensee shall render to the Secretary of Commerce such accounts as the Secretary of Commerce shall direct in respect of all charges due or payable under the International Radiotelegraphic Convention in respect of messages exchanged between the station hereby licensed and other stations and shall pay to the Secretary of Commerce, at such times and in such manner as the Secretary of Commerce shall direct, all sums which shall be due from the Licensee under such accounts.

5. The apparatus shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

6. The station shall give absolute priority to signals and radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, shall refrain from sending until all signals and radiograms relating thereto are completed.

7. The station during the hours of operation shall listen in at intervals of not less than 15 minutes and for a period of not less than 2 minutes with the receiver tuned to receive messages of 300 meters wave length.

8. The station shall use the minimum amount of energy necessary to carry out any communication desired, except in case of signals or radiograms relating to vessels in distress.

9. The station shall exchange radiograms with any other commercial station and with any ship station without distinction of the radio systems adopted by such stations.

10. The station shall not use a transmitter during the first 15 minutes of each hour, local standard time, except for distress signals, whenever the Secretary of Commerce by notice in writing shall require it to observe a division of time, pursuant to the Twelfth Regulation of the act of August 13, 1912.

11. The President of the United States in time of war or public peril or disaster is authorized by law to close the station and cause the removal therefrom of all radio apparatus or may authorize the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

12. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorized by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

13. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following schedule, except with the approval of the Secretary of Commerce.

Schedule of station and apparatus.

Location: State, _____; County, _____
City or Town, _____; Street, _____ No. _____

Geographical location: Latitude, N. ____° ____' ____"; Longitude, W. ____° ____' ____"
Specific hours authorized during which the station must be open to service
(local standard time): _____

Power: Transformer input, _____ KW.

Normal day range in nautical miles with ships at sea, -----
Time and method, if any, of sending time signals and hydrographic and meteorological radiograms: -----

----- Call letters, -----
-----; Coast charges: per word -----; minimum per radiogram -----
-----; Coast charges: per word -----; minimum per radiogram -----
-----; Coast charges: per word -----; minimum per radiogram -----

Radiotelegraphic system employed: -----
Characteristics of transmitting system: -----
Type of spark gap, -----
Approximate spark frequency, -----

Characteristics of receiving system: -----
Type of receiver, -----
Wave length of receiving system: From ----- meters ----- meters.
Antenna: Number of masts, -----; Height, -----

Type of aerial, -----
Wires: Number, -----; Size and kind, -----
Essential dimensions, -----

Wave lengths.

The normal sending and receiving wave length shall be ----- meters, and no other wave length shall be used for general public correspondence with any foreign ship or foreign coast station, except for long-range public service or purposes other than general public correspondence.

The station shall at all times, except as provided in the seventh paragraph of this License, be ready to receive messages of such wave lengths as are required by the International Radiotelegraphic Convention; shall be prepared to use two sending wave lengths, one of 300 meters and one of 600 meters, as required by the International Radiotelegraphic Convention in force; and tuning positions on the receiver shall be plainly marked: *Provided*, That the Secretary of Commerce may, in his discretion, change the limit of wave length reservations to accord with any international agreement to which the United States is a party.

For long-range public service and for any service other than general public correspondence the station is authorized to use the following additional wave lengths under 600 or over 1,600 meters:

Meters, -----; Meters, -----; Meters, -----; Meters, -----

The energy, if radiated by the transmitter in two or more wave lengths as indicated by a sensitive wave meter, shall not in any one of the lesser waves exceed 10 per cent of that in the greatest; and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress.

Sending wave length.*	Antenna current (amperes).	Logarithmic decrement.	Reading of wave meter indicating instrument.†	
			Principal wave.	Wave next in energy.
600 meters.....
300 meters.....
meters.....
meters.....
meters.....

* Underscore normal.
† Type of indicating instrument, -----

The station insures rapid exchange with land wire stations of the

(Company)

(Location telegraph office)

(Company)

(Location telegraph office)

In the following manner :

Satisfactory proof has been furnished that the station was actually operating August 13, 1912.

This license will expire on the _____ day of _____, 191_____

Secretary of Commerce.

Commissioner of Navigation.

Washington, D. C., _____, 191_____

INSPECTIONS.

Date.	Inspector.	Remarks.

No. _____

LICENSE FOR SHIP RADIO STATION.

[Department of Commerce. Bureau of Navigation. Radio Service.]

Pursuant to the act to regulate radio communication, approved August 13, 1912, _____, a citizen of the State of _____,

a company incorporated under the laws of the State of _____, having applied therefor, is hereby granted by the Secretary of Commerce for a period of _____, on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the schedule hereinafter) on the _____

(Type of vessel.)

called _____, a vessel of the United States, official number _____,

(Name of vessel.)

for the purpose of transmitting to and receiving from other ship stations and land stations general public correspondence, Government and service correspondence, and distress signals and messages, at rates of compensation not in excess of those fixed by the international agreement to which the Government of the United States has adhered, which have been submitted to and approved by the Secretary of Commerce, as included in the schedule hereinafter.

2. The use or operation of apparatus for radio communication pursuant to this License shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made by the President "to the end that the same and every article and clause thereof may be observed and fulfilled with good faith by the United States and the citizens thereof," and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The authority conferred by this License is subject to the provisions of the act of February 4, 1887, entitled "An Act to regulate commerce," as amended by the act of June 18, 1910, so far as the Licensee may be within the operation of said act, and except as provided in the act of August 13, 1912, or in the International Radiotelegraphic Convention and regulations made part thereof, the station shall transmit all messages offered by those who tender lawful rates on equal terms without discrimination, whether as regards rates, order of transmission, or otherwise.

4. The Licensee shall render to the Secretary of Commerce such accounts as the Secretary of Commerce shall direct in respect of all charges due or payable under the International Radiotelegraphic Convention in respect of messages

exchanged between the station hereby licensed and other stations, and shall pay to the Secretary of Commerce, at such times and in such manner as the Secretary of Commerce shall direct, all sums which shall be due from the Licensee under such accounts.

5. The apparatus shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce, except when in case of emergency the Collector of Customs by authority of the Secretary of Commerce shall issue a temporary permit, in lieu of a license, to the operator. The operator of the apparatus shall not willfully or maliciously interfere with any other radio communication.

6. The station shall give absolute priority to signals and radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, shall refrain from sending until all signals and radiograms relating thereto are completed.

7. The station shall be prepared to send the international signal of distress and distress signals on the normal wave length designated by the International Radiotelegraphic Convention in force with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a ship station equipped with apparatus for sending and receiving equal in all essential particulars to the apparatus of the station herein licensed.

8. The station shall use the minimum amount of energy necessary to carry out any communication desired, except in case of signals or radiograms relating to vessels in distress.

9. The station shall exchange radiograms with any other ship station without distinction of the radio systems adopted by such stations.

10. The station shall not use, except for sending signals of distress or signals and radiograms relating thereto, or when, owing to unusual circumstances, communication can be established only by means of an increase of power, a transformer input exceeding one kilowatt, or exceeding one-half kilowatt when within 5 nautical miles of a naval or military station.

11. The President of the United States in time of war or public peril or disaster is authorized by law to close the station and cause the removal therefrom of all radio apparatus, or may authorize the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

12. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorized by him may at all reasonable times enter upon the station for the purpose of inspecting, and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

13. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following schedule, except with the approval of the Secretary of Commerce.

Schedule of station and apparatus.

Ship: Name, -----; Owner, -----
Home port, -----; International code letters, -----

Radio call letters, -----

Nature of service: -----

Hours of operation: -----

Power: Transformer input, ----- K W. Primary source of power, -----

Normal day range in nautical miles with other ships at sea, -----

Ship charge: Per word, -----; Minimum per radiogram, -----

Per word, -----; Minimum per radiogram, -----

Radiotelegraphic system employed: -----

Characteristics of transmitting system:

Type of spark gap, -----

Approximate spark frequency, -----

Characteristics of receiving system:

Type of receiver, -----

Wave length range of receiving system: From ----- meters to ----- meters

Antenna: Number of masts, -----; Height, -----
 Type of aerial, -----
 Wires: Number, -----; Size and kind, -----
 Essential dimensions, -----

Auxiliary apparatus: Type, -----
 Power: Source, -----; Normal day range with ships, -----

Wave lengths.

The normal sending and receiving wave lengths shall be 600 meters, and the station shall be prepared to use two sending wave lengths, one of 600 meters and one of 300 meters, as required by the International Radiotelegraphic Convention in force; and tuning positions shall be plainly marked: *Provided*, That the Secretary of Commerce may, in his discretion, change the limit of wave length reservations to accord with any international agreement to which the United States is a party.

A wave length of ----- meters and the following additional wave lengths not exceeding 600 meters may be employed as authorized by law and treaty:

Meters, -----; Meters, -----; Meters, -----; Meters, -----; Meters, -----

The energy, if radiated by the transmitter in two or more wave lengths as indicated by a sensitive wave meter, shall not in any one of the lesser waves exceed 10 per cent of that in the greatest, and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress and in sending distress signals when the transmitter may be tuned to create a maximum of interference with a maximum of radiation.

Sending wave length.*	Antenna current (amperes).	Logarithmic decrement.	Reading of wave meter indicating instrument.†	
			Principal wave.	Wave next in energy.
600 meters.....
300 meters.....
meters.....
meters.....
meters.....

* Underscore normal.

† Type of indicating instrument, -----

The station in general shall transmit its radiograms to the nearest coast station. The sender shall have the right, however, to designate the coast station through which he desires to have his radiograms transmitted, and his wishes shall be complied with only if the transmission can be effected without interfering with the service of other stations, or the shipboard station shall wait until such coast station shall be the nearest as provided by the International Convention in force.

Satisfactory proof has been furnished that the station was actually operating August 13, 1912.

This License will expire on the ----- day of -----, 191..

[SEAL.]

Secretary of Commerce.

Commissioner of Navigation.

Washington, D. C., -----, 191..

INSPECTIONS.

Date.	Inspector.	Remarks.
.....
.....
.....
.....
.....

No.-----

LICENSE FOR LAND RADIO STATION.

Class-----

[Department of Commerce. Bureau of Navigation. Radio Service.]

Pursuant to the act to regulate radio communication, approved August 13, 1912, ----- a citizen of the State of -----, a company incorporated under the laws of the State of -----, having applied therefor, is hereby granted by the Secretary of Commerce for a period of ----- on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the schedule hereinafter) for the purpose of transmitting to and receiving from ship stations and other land stations public correspondence, Government and service correspondence, and distress signals and messages, at rates of compensation not in excess of those fixed by the international agreement to which the Government of the United States has adhered, which have been submitted to and approved by the Secretary of Commerce, as included in the schedule hereinafter, or for the purpose of conducting experiments for the development of the science of radio communication or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations, the purpose of the station being designated by the classification at the head of this License.

2. Public correspondence or limited commercial correspondence authorized by this License shall be limited to certain stations, ships or lines of ships named hereinafter, which designation is authorized in view of the nature of the service and is independent of the radio system employed.

3. The use or operation of apparatus for radio communication pursuant to this License shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President, and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States, in so far as they apply to the class of station indicated by this License.

4. The authority conferred by this license is subject to the provisions of the act of February 4, 1887, entitled, "An act to regulate commerce," as amended by the act of June 18, 1910, so far as the licensee may be within the operation of said act, and except as provided in the act of August 13, 1912, or in the International Radiotelegraphic Convention and regulations made part thereof, the station shall transmit all messages offered by those who tender lawful rates on equal terms without discrimination, whether as regards rates, order of transmission, or otherwise.

5. The Licensee shall render to the Secretary of Commerce such accounts as the Secretary of Commerce shall direct in respect of all charges due or payable under the International Radiotelegraphic Convention in respect of messages exchanged between the station hereby licensed and other stations and shall pay to the Secretary of Commerce, at such times and in such manner as the Secretary of Commerce shall direct, all sums which shall be due from the Licensee under such accounts.

6. The apparatus shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not willfully or maliciously interfere with any other radio communication.

7. The station shall give absolute priority to signals and radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, shall refrain from sending until all signals and radiograms relating thereto are completed.

8. The station shall use the minimum amount of energy necessary to carry out any communication desired, except in case of signals or radiograms relating to vessels in distress.

9. The station shall not use a transmitter during the first 15 minutes of each hour, local standard time, except for distress signals, whenever the Secretary

of Commerce by notice in writing shall require it to observe a division of time, pursuant to the Twelfth Regulation of the act of August 13, 1912.

10. The President of the United States in time of war or public peril or disaster is authorized by law to close the station and cause the removal therefrom of all radio apparatus or may authorize the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

11. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorized by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

12. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following schedule, except with the approval of the Secretary of Commerce.

Schedule of station and apparatus.

Name of owner, -----
Location: State, -----; County, -----
City or town, -----; Street, -----; No. -----

Geographical location: Latitude, N. ____° ____' ____"; Longitude, W. ____° ____' ____"
This station is licensed for communication only with the following land stations, ships, or lines of ships:

Specific hours during which the station must be open to service (local standard time):

Power: Transformer input, ----- KW.
Normal day range in nautical miles, -----
Time and method, if any, of sending time signals and hydrographic and meteorological radiograms:

Call letters, -----
-----; Coast charges: per word -----, minimum per radiogram -----
-----; Coast charges: per word -----, minimum per radiogram -----
-----; Coast charges: per word -----, minimum per radiogram -----

Radiotelegraphic system employed, -----
Characteristics of transmitting system:

Type of spark gap, -----
Approximate spark frequency, -----

Wave length range of receiving system: From ----- meters to ----- meters.

Antenna: Number of masts, -----, Height, -----, -----
Type of aerial, -----

Wires: Number, -----; Size and kind, -----
Essential dimensions, -----

Wave lengths.

The normal sending and receiving wave length shall be ----- meters.

If the station be classified as a coast station, it shall be prepared to transmit or relay distress calls or messages using the distress wave length as provided by the International Radiotelegraphic Convention in force.

In view of special conditions the station is authorized to use for communication exclusively with stations licensed by the United States the following additional wave lengths under 600 or over 1,600 meters:

Meters, -----; Meters, -----; Meters, -----; Meters, -----

462 GOVERNMENT CONTROL OF RADIO COMMUNICATION.

The energy, if radiated by the transmitter in two or more wave lengths as indicated by a sensitive wave meter, shall not in any one of the lesser waves exceed 10 per cent of that in the greatest; and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress.

Sending wave length.	Antenna current (amperes).	Logarithmic decrement.	Reading of wave meter indicating instrument.*	
			Principal wave.	Wave next in energy.
300 meters.....				
600 meters.....				
meters.....				
meters.....				
meters.....				

* Type of indicating instrument,

The station insures rapid exchange with land wire stations at

(Company.)

(Location telegraph office.)

(Company.)

(Location telegraph office.)

In the following manner:

Satisfactory proof has been furnished that the station was actually operating August 13, 1912.

This License will expire on the _____ day of _____, 191__.

[Seal of Department of Commerce.]

Secretary of Commerce.

Commissioner of Navigation.

Washington, D. C., _____, 191__

INSPECTIONS.

Date.	Inspector.	Remarks.
.....
.....
.....
.....
.....
.....
.....

No. _____

LICENSE FOR _____ AMATEUR RADIO STATION.
(General or restricted.)

[Department of Commerce. Bureau of Navigation. Radio Service.]

Pursuant to the act to regulate radio communication, approved August 12, 1912, _____, a citizen of the State of _____, having applied therefor, is hereby granted by the Secretary of Commerce, for a period of _____ year, on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this License to use or operate the apparatus for radio communication (identified in the Schedule hereinafter) for the purpose of transmitting private radiograms or signals, notwithstanding the effect thereof extends beyond the jurisdiction of the State or Territory in which the said station is located: *Provided*, That no interference other than may result under the restrictions contained in this License shall be caused with the radio communication of stations of the Government of the United States or licensed stations.

2. The use or operation of apparatus for radio communication pursuant to this License shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President, and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The apparatus shall at all times while in use and operation be in charge of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

4. The station shall give absolute priority to signals or radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and shall refrain from sending until all the signals and radiograms relating thereto are completed.

5. The station shall use the minimum amount of energy necessary to carry out any communication desired, and the transformer input shall not exceed one-half kilowatt.*

6. The station shall not use a transmitting wave exceeding 200 meters.

7. The station shall not use a transmitter during the first 15 minutes of each hour, local standard time, whenever the Secretary of Commerce by notice in writing shall require it to observe a division of time, pursuant to the Twelfth Regulation of the act of August 13, 1912.

8. The President of the United States in time of war or public peril or disaster is authorized by law to close the station and cause the removal therefrom of all radio apparatus, or may authorize the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

9. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorized by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

10. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following Schedule except with the approval of a radio inspector or other duly authorized officer of the Government.

Schedule of station and apparatus.

Name of owner, _____; Age, _____

Location: State, _____; County, _____

City or town, _____; Street, _____; No., _____

Official call, _____

Name of naval or military station, if within 5 nautical miles, _____

Power: Transformer input, _____, W.†

Antenna: Type (T, L, fan, umbrella, etc.), _____

Height, _____; Horizontal length, _____

(Above ground.)

Wires: Number in vertical part, _____; In horizontal part, _____

The normal sending and receiving wave length shall be _____ meters
(Not exceeding 200.)

and the station is authorized to use the following additional wave lengths, not exceeding 200 meters: _____ meters, _____ meters.

Satisfactory proof has been furnished that the station was actually operating August 13, 1912.

This License expires on _____, 191__

EDWIN F. SWEET,
Assistant Secretary of Commerce.

E. T. CHAMBERLAIN,
Commissioner of Navigation.

Delivered by _____
(Radio Inspector.)

Place, _____, Date, _____, 191__

* Strike out "one" if the station be within 5 nautical miles of a naval or military station; otherwise strike out "one-half."

† Not to exceed 1,000; or if the station be within 5 nautical miles of a naval or military station, not to exceed 500.

No. _____

[The United States of America. Department of Commerce. Bureau of Navigation.]

LICENSE TO RADIO OPERATOR, COMMERCIAL EXTRA FIRST GRADE.

This is to certify that _____
 has been examined and passed, pursuant to the Radiotelegraphic Convention, in
 (a) adjustment, operation and care of apparatus;
 (b) transmitting and sound reading at a speed of _____ words a
 minute, Continental Morse, and _____ words a minute
 American Morse;;
 (c) use and care of storage battery or other auxiliary;
 (d) Knowledge of international regulations and Acts of Congress to regulate
 radio communication;
 (e) knowledge of United States Naval Radio Regulations;
 and is hereby licensed, as required by law, a Radio Operator, Commercial Extra
 First Grade, for two years.

In testimony of trustworthiness and efficient service as Radio Operator for
 _____ months, of which _____ months were service at sea, and of
 superior knowledge and skill, ascertained by special examination, this extra
 grade license is granted.

Oath of Secrecy executed. _____
 (Examining officer.) Secretary of Commerce.

Title. _____

Notary Public. _____

Place _____ Date _____ 191__ Commissioner of Navigation.

No. _____

[The United States of America. Department of Commerce. Bureau of Navigation.]

LICENSE TO RADIO OPERATOR, COMMERCIAL ¹ _____ GRADE.

This is to certify that _____
 has been examined and passed, pursuant to the Radiotelegraphic Convention, in
 (a) adjustment, operation and care of apparatus;
 (b) transmitting and sound reading at a speed of not less than ² _____ words
 a minute, Continental Morse;
 (c) use and care of storage battery or other auxiliary;
 (d) knowledge of international regulations and Acts of Congress to regulate
 radio communication;
 and is hereby licensed as required by law a Radio Operator, Commercial ¹ _____
 grade for two years. The candidate's practical knowledge of adjustment was
 tested on a _____ set of apparatus. His knowledge of other systems is
 shown below.

Oath of Secretary executed. _____
 (Examining Officer.) WILLIAM C. REDFIELD,
 Secretary of Commerce.

(Title.) _____ Notary Public. _____
 Place _____ Date _____ 191__ E. T. CHAMBERLAIN,
 Commissioner of Navigation.

¹ First or Second.² Twenty or Twelve.

No. _____
[The United States of America. Department of Commerce. Bureau of Navigation.]

LICENSE TO RADIO OPERATOR, AMATEUR FIRST GRADE.

This is to certify that _____ has been examined and shown to have a knowledge of the adjustment and operation of apparatus and of the regulations of the Radiotelegraphic Convention and the Acts of Congress in so far as they relate to interference with radio communication and impose certain duties on all grades of operators sufficient to entitled him to a license, and he is hereby licensed as required by law Radio Operator, Amateur First Grade for two years.

The candidate was examined and shown to have knowledge (excellent or good). In the following additional subjects:

- (a) general adjustment, operation and care of apparatus¹ _____
- (b) transmitting and sound reading Continental Morse at a speed of _____ words a minute;
- (c) general knowledge of international regulations and Acts of Congress to regulate radio communication² _____

Oath of Secretary executed.

(Examining Officer.) _____

(Title.) _____

Notary Public.

Place _____, Date, _____, 191_____

WILLIAM C. REDFIELD,
Secretary of Commerce.
E. T. CHAMBERLAIN,
Commissioner of Navigation.

No. _____

[United States of America. Department of Commerce. Bureau of Navigation. Radio service.]

LICENSE TO RADIO OPERATOR, AMATEUR SECOND GRADE.

This is to certify that _____ has presented satisfactory evidence that he has a knowledge of the adjustment and operation of apparatus and of the regulations of the Radiotelegraphic Convention and the Acts of Congress, in so far as they relate to interference with radio communication and impose certain duties on all grades of operators, sufficient to entitle him to a license, and he is hereby temporarily licensed as RADIO OPERATOR, AMATEUR SECOND GRADE, for the period of eight months or until he has been duly examined.

He has also shown that he has knowledge (excellent or good) of the following additional subjects:

- (a) General adjustment, operation, and care of apparatus _____ (Excellent or good.)
- (b) Transmitting and sound reading Continental Morse at a speed of _____ words a minute.
- (c) General knowledge of international regulations and Acts of Congress to regulate radio communication _____ (Excellent or good.)

Oath of secrecy executed:

(Certifying officer.) _____

(Title.) _____

Notary Public.

Place, _____ Date, _____, 191_____

WILLIAM C. REDFIELD,
Secretary of Commerce.
E. T. CHAMBERLAIN,
Commissioner of Navigation.

¹ Excellent or good.

² Insert speed.

[Operators licenses are not valid until the following oath has been executed on the backs of the licenses:]

I, _____, do solemnly swear that I will faithfully preserve the secrecy of all messages coming to my knowledge through my employment under this license; that this obligation is taken freely, without mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties of the office: So help me God.

(Signature of holder.)

Date of birth, _____ Place of birth, _____
Sworn to and subscribed before me this _____
day of _____, A. D., 191____

Notary Public,

[SEAL.]

SERVICE RECORD.

This is to certify that the holder of this license has served satisfactorily as radio operator under my orders during the period named.

Name of Ship or Land Station.	Period.	Master, Manager, or Superintendent.
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____
_____	From _____, 19____, to _____, 19____	_____

Operators must have the service record on the backs of their licenses properly completed and signed by the master of their ship or their employer.

[Department of Commerce. Radio service.]

INTERNATIONAL MORSE CODE AND CONVENTIONAL SIGNALS.

[To be used for all general public service radio communication. (1) A dash is equal to three dots; (2) the space between parts of the same letter is equal to one dot; (3) the space between two letters is equal to three dots; (4) the space between two words is equal to five dots.]

A . —	Period.....
B —	Semicolon..... — . — . — .
C — . — . .	Comma..... — . — . — .
D — . . .	Colon..... — — — . . .
E .	Interrogation..... — — — . .
F . . — . .	Exclamation point..... — — . . — .
G — . — .	Apostrophe..... — . — . — .
H	Hyphen..... — —
I . .	Bar indicating fraction..... —
J . — — —	Parenthesis..... — . — . — . —
K — . —	Inverted commas..... —
L	Underline..... — . — . — .
M — — —	Double dash..... — —
N — .	Distress Call..... — . — . —
O — — —	Attention call to precede every transmission..... —
P — . — .	
Q — . — . —	
R . — .	
S . . .	
T —	
U . . —	
V . . . —	
W — — —	
X — . . . —	
Y — — — —	
Z — — — .	
Ä (German)	General inquiry call..... — — . — .
Å or Ä (Spanish-Scandinavian)	From (de)..... —
CH (German-Spanish)	Invitation to transmit (go ahead)..... —
Ê (French)	Warning—high power..... — . — . — . —
Ñ (Spanish)	Question (please repeat after)—interrupting long messages..... —
Ö (German)	Wait..... —
Ü (German)	Break (Bk.) (double dash)..... — —
	Understand..... —
1 . — — — —	Error..... —
2 . . — — —	Received (O. K.)..... —
3 . . . — —	
4 —	Position report (to precede all position messages)..... —
5	
6 — — — —	End of each message (cross)..... — — .
7 — — — . .	
8 — — — .	Transmission finished (end of work) (conclusion of correspondence)..... —
9 — — — .	
0 — — — —	

(The chairman submitted the following letter for the record:)

NAVY DEPARTMENT,
Washington, January 2, 1919.

MY DEAR JUDGE ALEXANDER: Referring to the recent hearings on H. R. 13159, I inclose herewith a copy of the letter from Prof. Pupin with the request that, if you have no objection, it be printed in the hearings as an appendix.

You will recall that Prof. Pupin appeared in opposition to H. R. 19350, in January, 1917, arguing that Government operation of all radio stations would retard radio development very seriously. The inclosed letter shows that, in addition to others, his ideas on the subject have changed. I consider this letter especially interesting in view of the fact that a number of opponents of the bill referred to Prof. Pupin as an authority in this particular matter, also referring to his testimony before your committee, mentioned above.

Sincerely, yours,

JOSEPHUS DANIELS.

The CHAIRMAN HOUSE COMMITTEE ON THE
MERCHANT MARINE AND FISHERIES.
House Office Building.

DECEMBER 20, 1918.

The Hon. JOSEPHUS DANIELS,
Secretary of the Navy, Washington, D. C.

DEAR SIR: I beg to submit to you the following memorandum, which embodies the substance, somewhat amplified, of our conversation of to-day:

It is the opinion of our naval authorities that the development of some of the submarine signaling and detection devices, which was inaugurated during this war under the auspices of the Navy, should be continued, and when completed the resulting new arts should remain under the control of the Navy. This opinion is shared by the scientific men, including myself, whose research work contributed to this development. This opinion is an expression of the general desire that arts which are essential to the efficiency and to the development of the Navy should be controlled by it.

A logical consequence of this desire is the belief, practically universal among our highest naval authorities, that other signaling devices, like wireless telegraphy and telephony, submarine cabling, fog signaling, etc., should also fall within the control of the United States Navy. The development of these and similar arts is a part of the development of the United States Navy and of the United States merchant marine. The scientific men of this country, and I count myself as one of them, will certainly become faithful followers of this belief provided that this control by our Navy of the above-mentioned young arts is a natural and not an artificial control. What I mean is this: A natural control is based upon results obtained by scientific research and development and not upon legislative enactments alone. The United States Navy will and can control any new art which is essential to its own development and to the development of the United States merchant marine if it is provided with adequate facilities for scientific research and development. No organization, industrial or educational, is as scientific in its structure as the United States Navy. Our modern battleships are the most concrete glorification of everything which is best in our American sciences and technical arts. It is unthinkable that such a highly scientific organization as our Navy can go on much longer without a naval laboratory for scientific and engineering research.

Research laboratories are the best investments which our great industrial organizations like the Western Electric Co., and the General Electric Co. have made during the last 20 years. The naval laboratory for scientific and engineering research, will be the most profitable investment ever made by the United States Navy. I believe that I interpret correctly the views of naval men when I say that they would heartily support this last statement of mine. It should also be observed that through its research laboratory and its scientific research men the Navy and the United States merchant marine would be brought into the closest touch with American science, which is now being organized by the National Research Council. You were kind enough, Mr. Secretary, to assure me to-day that such a laboratory was contemplated by the United States Navy, and that by next spring it would be an accomplished fact. I assume that you had in mind a research laboratory sufficiently large to take

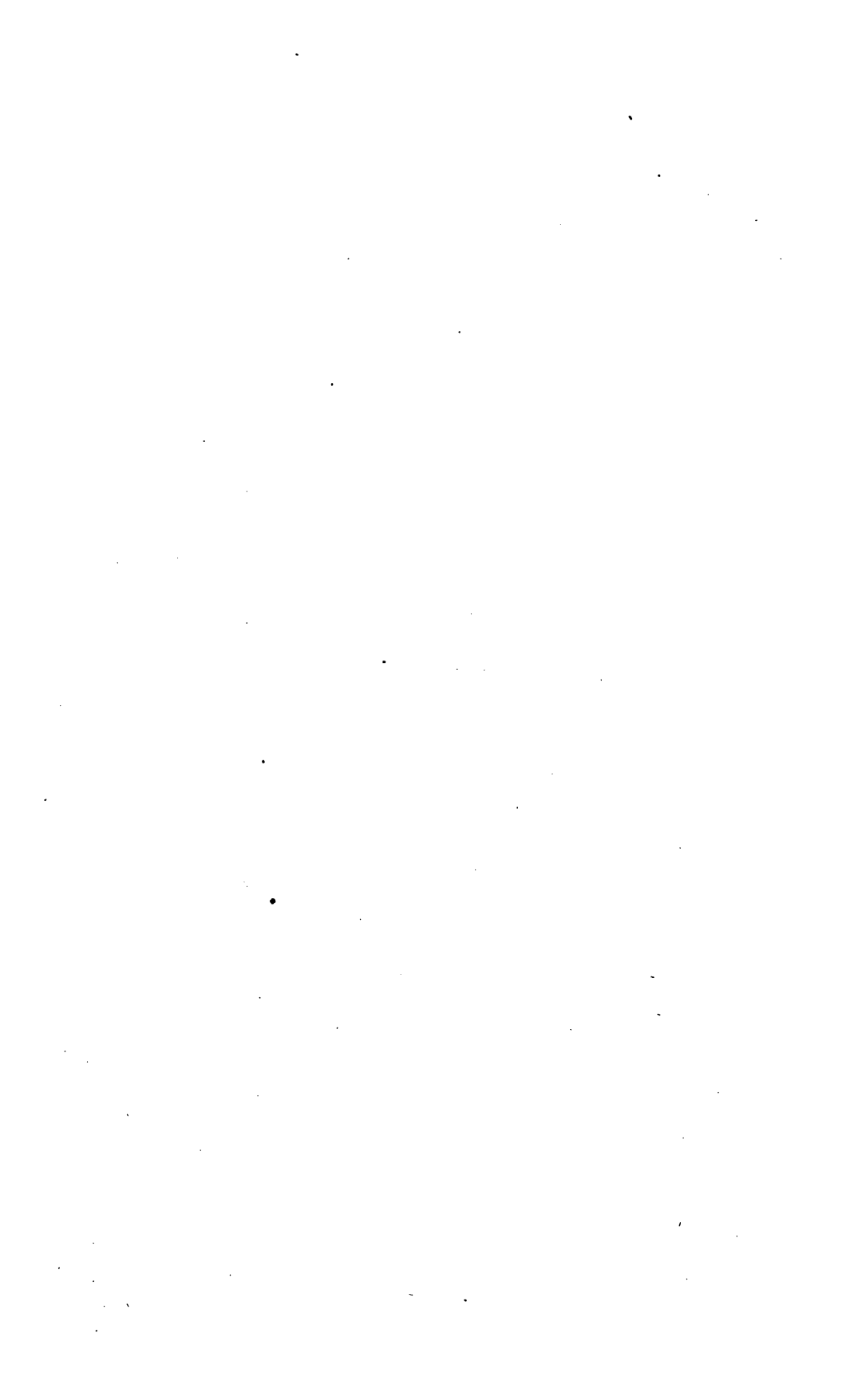
care of the most pressing problems now before the Navy and not of all the problems that will present themselves in the course of time. Submarine signaling, wireless telegraphy, cabling, and fog signaling, offer some of the most pressing naval problems, and a naval research laboratory, capable of handling these problems, can, with sufficient and speedy push, be organized and started in motion by next spring. With such a laboratory in view, to take care of the young arts mentioned above, the opposition to Government ownership of these arts falls to the ground, granting, as I do, that a natural control by the Navy of these arts is essential to the progress of an organization. To illustrate, some two years ago I was opposed to Government ownership of the wireless stations and my opposition was based principally upon the ground that the United States Navy did not possess an organization capable of developing the wireless art and of taking care of the meritorious inventor who contributes to this art. The prospect of a naval research laboratory removes the very ground upon which my opposition rested, and, moreover, it urges me to favor what I formerly opposed. Other scientific men, with whom I have discussed this matter, have the same mental attitudes.

Yours, very respectfully,

M. I. PUPIN.









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